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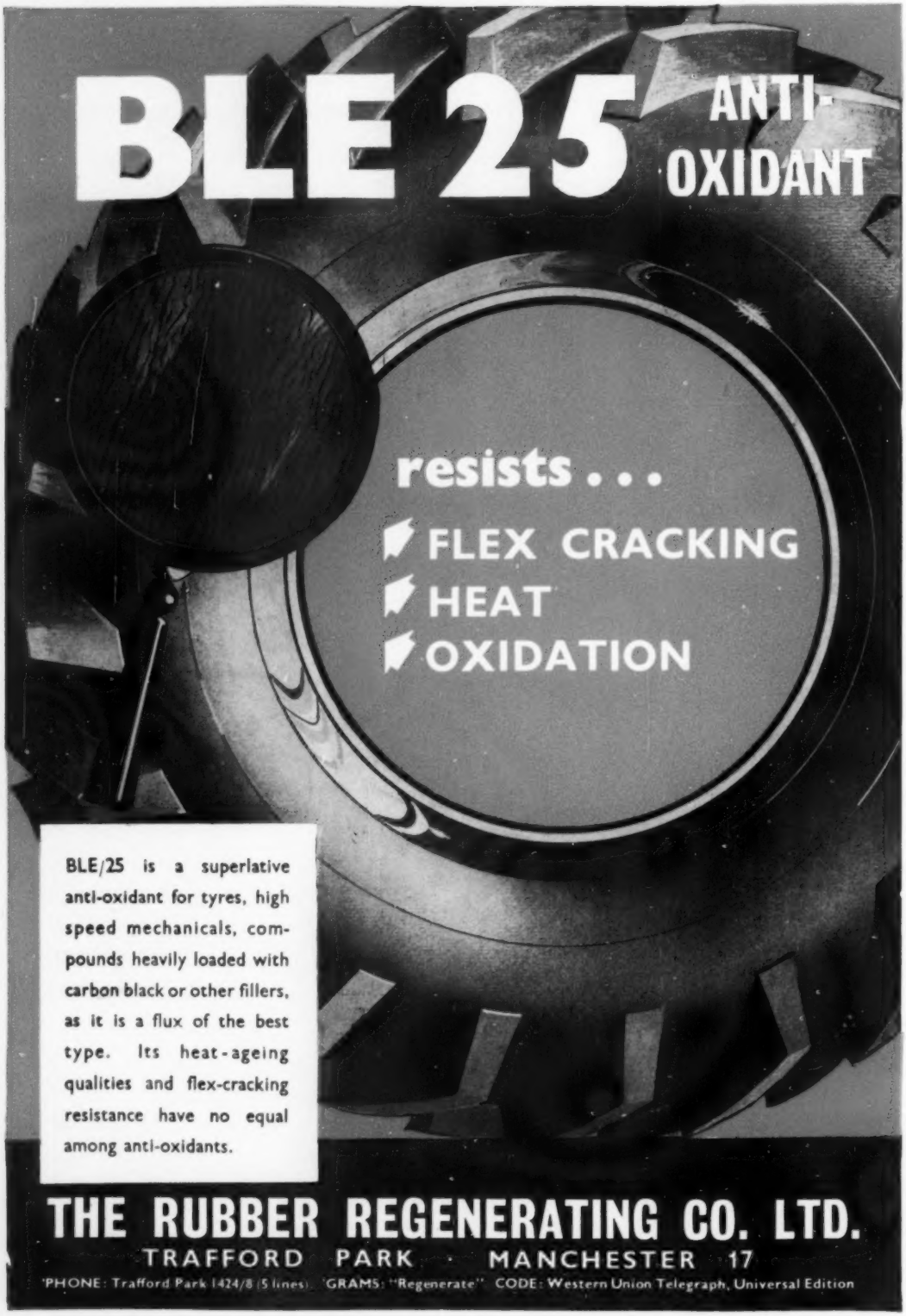

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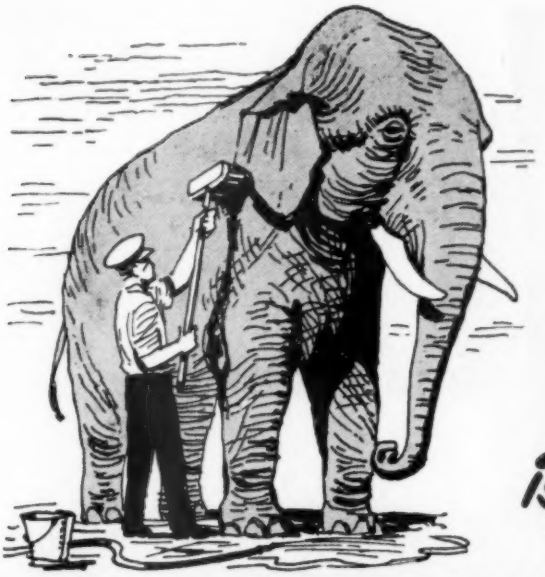

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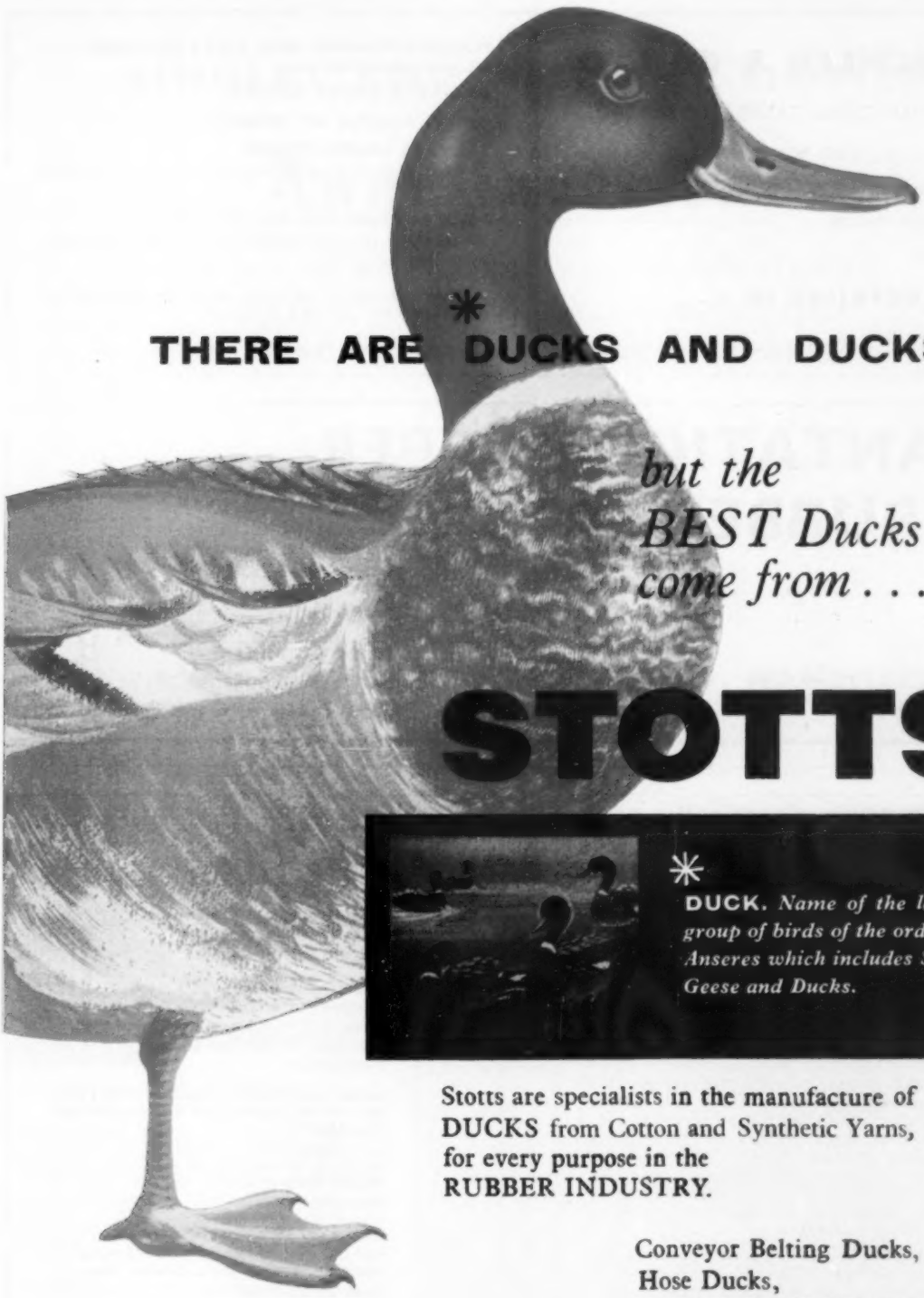

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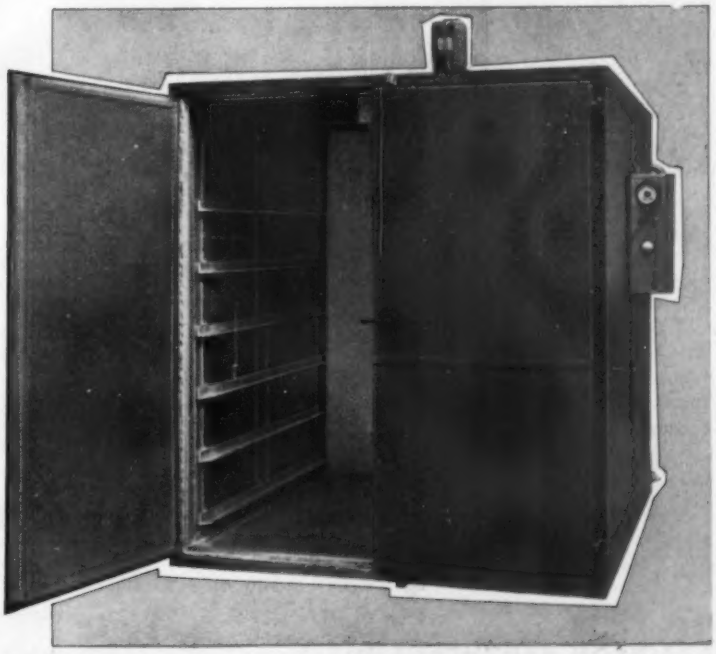

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IN ITS 77th YEAR

October 29 1960

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NOTES of the WEEK

Naturally Undeterred

IN round figures the area planted in rubber in Malaya totals 3,500,000 acres. Of these, approximately 1,485,000 acres are high yielding and 2,015,000 unselected seedlings. If the present rate of replanting continues at approximately 65,000 acres per annum each for both smallholders and estates, theoretically at least, states the Natural Rubber Bureau in the October *Natural Rubber News*, 100% of the estate area could be completely replanted by 1972 and 100% of the smallholder area could be replanted by 1976. Any step-up in the current rate would of course mean an earlier attainment of the 100% objective.

The combined effect of the three major elements contributing to increased yields—genetic selection, improved extraction methods and plant husbandry—will, in one recognized authority's opinion, bring about substantial increases in Malayan production figures if the present rate of replanting and/or new planting is maintained. For 1960, the estimate is 735,000 long tons. This rises successively to 965,000 for 1965; to 1,275,000 for 1970 and to 1,520,000 for 1975.

The *Natural Rubber News* quotes a statement by Mr W. E. Klippert, general manager of Goodyear's plantations division, which makes interesting reading, especially in connexion with recent mentions of 'yield barrier' or 'saturation point' on high yields. Mr Klippert said 'The cost of producing a pound of rubber on an 800lb. per acre yield is just half the cost where the yield is 350lb., and the cost for a 1,200lb. per acre yield is less than one third.' Mr H. C. Bugbee, of the NRB, extends this to some interesting figures. Assuming hypothetically, he says, that the fob port of shipment all-in cost for rubber produced from an estate yielding at the rate of 350lb. per acre per year is say US 30c per lb., then an estate producing at the rate of 800lb. per acre would have all-in costs in the neighbourhood of 15c per lb., and one producing at 1,200lb. per acre would cost out at 10c per lb. Export duty varies on a graduated scale with the market price for rubber but if we picked a market at say 30c per lb., the total applicable duty would be about 5c per lb. to which would be added another 2½c to bring the rubber to a landed New York basis or 22½c for 1 RSS on the 800 lb. per acre basis, or 17½c on the 1,200lb. per acre basis for standard 1 RSS.

From more than one source recently have come estimates that improved high yield trees have a potential yield of from 2,000 to 3,000lb. per acre. Such a yield would further reduce production costs per pound of rubber and would make for considerable competition *viz a viz* producers of 'synthetic-natural' if there should be in the years ahead a surplus of 'natural-natural.'

Industry and Education

IN a booklet published this week, 'Co-operation between Industry and Education,' the Industrial Training Council gives an account of arrangements in some 40 industries for co-operation between those industries and various educational bodies at national, regional and local levels in respect of the further education and training of workpeople up to the craft level. The booklet summarizes the main functions served by these arrangements under such headings as 'Arrangements and running of courses'; 'Selection of workers for courses'; 'Supervision, welfare and discipline of workers undergoing courses'; 'Part-time teachers from industry in technical colleges'; 'Refresher courses in industry for technical college teachers' and 'Provision of equipment, etc., by employers to technical colleges.'

The main achievements and practical results brought about as a result of such co-operation depend, however, to a large degree upon the effectiveness of the local machinery, and this is illustrated in the booklet by some 30 detailed examples from 20 industries which show the way in which co-operation has worked in practice at local level and how particular problems, often peculiar to an industry or locality, have been met through such co-operation.

Exports

ACCORDING to figures released this week, UK exports for the month ended September 1960 appear to be approximately one-fifth down overall on the corresponding figures for September 1959. This is a sad state of affairs, some of the blame for which can be laid on the tally clerks' strike. However, our industries have not followed the general trend, although increases are slight. Exports of plastics materials for September 1960 totalled £3,398,085 in value against £3,268,034 for September last year. Against this must be set a rise in imports of plastics materials of over 50% during the first nine months of 1960; from approximately £14m. to £22m. On the brighter side were exports of plastics and rubber machinery, up for September 1960 to £556,801 from the September 1959 figure of £359,295. Nine month figures for machinery exports in this category were: this year, £8,777,514; 1959, £7,265,490.

NEWS *Briefs*

DANISH PLASTICS PLANT GOES UP—MAN-MADE FIBRE RECORD—PIRELLI IN FRANKFURT—USSR ORDERS FOR UK—NIGERIAN LOAN—CUBAN COUP

●**Japan** — Dayton Rubber Int., a division of the Dayco Corporation, has signed a long-term technical assistance and licensing contract with Mitsuboshi Belting Ltd., Japan's largest maker of V-belts. The Japanese concern, with headquarters in Kobe, is licensed to make Dayton V-belts for sale in Japan and the Far East under the Dayton-Mitsuboshi label. Machinery for the manufacture of the V-belts will be purchased in the United States, Richard Rosenberg, vice-president of Dayton Int., said.

●**United States** — Construction of additional production facilities at Grace Chemical's Owensboro, Kentucky, plant has begun. The expansion of the plant, which manufactures synthetic rubber and polyvinyl acetate emulsions, is expected to cost $1m. and increase employment by 25%.

●**Germany** — Pirelli shares were admitted to official trading on the Frankfurt Bourse on October 25. Trading was done in bearer certificates. Pirelli already had an unofficial Frankfurt quotation.

●**United Kingdom** — Man-made fibre production was a record in September. Figures issued by the British Man-Made Fibres Federation show that the total output of filament yarn and staple was 48.52m. lb. This compares with a total for September last year of 43.45m. lb. The figure for August this year was 43.18m. lb.

●**Italy** — Anic's Ravenna butadiene plant is said to have reached its design capacity of 20,000 tons. This plant, which uses a Houdry dehydrogenation unit, is feeding Anic's synthetic rubber complex at Ravenna.

●**Nigeria** — The Commonwealth Development Finance Co. has now completed arrangements for the 15-year loan of £1m. to Dunlop Nigerian Plantations Ltd. of Calabar.

●**United States** — The US Army has awarded a $6m. contract to Firestone Tire and Rubber for the production of M-17 combat gas masks. Developed by the Army Chemical Corps, the M-17 is said to be the first major change in mask construction since 1947, and is designed to give respiratory protection against war gases, germ warfare elements, and airborne radioactive fallout particles.

●**United Kingdom** — An industrial solvent, the basic raw material for which is a by-product of plastics manufacture, is to be marketed in the UK by Penetone-Paripan for Dow Chemical of Michigan. Called Chlorothene NU, it is claimed to be the least toxic of available chlorinated solvents. It can be tolerated in 20 times the atmospheric concentration of benzene.

●**Russia** — A contract for 6½ miles of specially designed conveyor belting for USSR has been awarded to the belting division of Dunlop Rubber. The duck for the belting will be made from 100% man-made fibres woven at the Dunlop mills at Rochdale. The belting itself will be manufactured at the division's plant on Merseyside. The belting, which is to be used to carry heavy ores, is said to be of very high tensile strength and is over 6ft. 6in. wide and more than 1in. thick. The largest individual belt weighs approximately 10½ tons.

●**Cuba** — The Cuban Government nationalized 167 American concerns on October 25. These are worth $200m. and include Goodrich and Firestone plants.

●**United Kingdom** — Burtonwood Engineering of Warrington have received £126,000 worth of orders from Russia and Western Europe following a three-week tour by their new sales director, R. V. Rowlands. 'Substantial orders for plastics machinery' were received from two Italian companies; from a Dutch company, who are extending their SBR plant, came a £26,000 order for equipment not previously built in the UK.

'I'm thinking of turning this in—young Blenkinsop on the Licentiateship Course has offered to take me on'—508

●**Italy** — Rumianca of Turin is to build a plant to manufacture US Rubber Co.'s plastics under licence. An agreement was recently concluded with the American firm in Turin.

●**Denmark** — Danbritkem A/S — the new Danish company half-owned by I.C.I. and having a capital of £4m.—has started constructing its polythene plant outside Copenhagen. The plant will be fed from the Mærsk refinery and is due to start production by the end of 1961. Capacity will be 15,000 tons.

THESE ARE NONOX *DAYS*

Industry constantly seeks to improve its processes, to find new methods and products even more suited to the demands of modern times than those already in use. This urge to advance has included a great deal of research in the field of antioxidants for rubber, work that has continued over the past 30 years in the laboratories of I.C.I.

Antioxidants for rubber are conventionally divided into two classes, the non-staining and the staining. The non-staining types are in particular demand for use in light-coloured rubber articles because they cause very little discoloration on exposure of the article to light.

Whereas staining antioxidants are predominantly aromatic amines, most non-staining antioxidants are phenolic. Relatively simple phenols are, in fact, antioxidants. Some 30 years ago I.C.I. were early in this field with their product Nonox W, essentially β-naphthol. This has since been replaced by a range of non-staining antioxidants of greater flexibility and efficiency.

It was found possible to avoid the known retarding effect on vulcanization of simple phenols by the use of more complex phenol derivatives. Nonox NS, and Nonox NSN which later supplemented it, are both of this type and were first developed in the 1930s. The non-staining properties of these products proved extremely good and further developments were aimed principally at gaining increased efficiency.

Notable advances were made during the second world war but it was not until 1948, when Nonox EX first became available, that these could be implemented. Although not quite maintaining the excellent non-staining properties of Nonox NS/NSN, Nonox EX gave significantly greater efficiency and set a pattern for more widespread use of non-staining antioxidants by the rubber industry. Similar products are Nonox EXN and EXP which differ from Nonox EX principally in physical form. Nonox EXP, in particular, provides a most attractive bead-form which is easily and cleanly handled.

Remarkable for the combination of efficiency with excellent non-staining properties is Nonox WSL. Although differing chemically, Nonox WSL is a substituted phenol, and resembles Nonox EX in all fields of efficiency except possibly heat resistance. A later product, Nonox WSP, is chiefly of interest because of the high degree of protection that it confers. Nonox WSP and WSL have proved of particular value in latex articles (such as foam) and mechanicals. It may be noted that Nonox EX/EXN/EXP are resinous and not easily used in latex processes.

The latest addition to the I.C.I. range is Nonox CNS. This product was developed principally as a non-staining copper inhibitor, i.e. an agent that counteracts the deleterious effects of metals such as copper and manganese on the ageing of rubbers. Nonox CNS is a synergistic mixture of, essentially, two agents, one reinforcing the effects of the other. Non-staining copper inhibitors are of interest in the manufacture of cable insulation and proofings. Nonox CNS is also a most effective antioxidant.

The I.C.I. range of non-staining antioxidants will not stand still. Out-dated products will be deleted and new products added as discoveries are made. The progress since the days of Nonox W has been substantial.

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Advertiser's announcement. X193

Cabot in Italy

NEW CARBON BLACK PLANT AT RAVENNA

THE new carbon black plant of Cabot Italiana was officially opened at Ravenna, Italy, on October 19. The gleaming and impressive plant, at present comprising one complete unit, was first formally blessed by the Archbishop of Ravenna. The general manager of Cabot Italiana, Mr Silvio Zennaro, then welcomed the more than 400 visitors, many of whom had arrived by special Cabot overnight trains from Rome and Milan.

Present output of the plant, at some 15,000 tons a year, includes Vulcan 3, Vulcan 6, Sterling SO and Regal 300 from the Cabot range. It is possible that Regal SRF will be produced later.

The site is an ideal one, although it took some time to locate and was by no means easy to prepare. There was a munitions dump there during the last war and the entire area had to be tested for landmines before any progress could be made. It was also infested with snakes, having a definitely lethal bite, and many thousands of these had to be killed. The plant has its own wharf, on a canal linked to the sea, and the warehouse flanks the company's rail siding. There is therefore direct connexion to road, rail and water for the transport of Cabot's carbon blacks.

As at the company's Stanlow, Cheshire, plant (*RJIP* August 20 1960, 264ff), the oil furnaces are arranged in horizontal banks at the side of the control room. Control is completely automatic. At Ravenna, however, besides the aromatic oil and air, methane, of which there are plentiful local supplies, is used instead of town gas. The process then follows a course similar to that at Stanlow: primary collection, after the hot gases have passed through water sprays, being in cyclone collectors where around 95% of the agglomerated particles of carbon black are separated from the gas stream. The hot gases then pass through a bag filter system to further cyclones, pulverizers, densifiers and so to the pelletizing drums. From here the black goes to bulk storage hoppers and thence either to the storage warehouse for packing into 55lb. bags or directly into road tankers.

It is in the Cabot tradition to provide excellent working conditions and Cabot Italiana is no exception. Changing rooms, wash rooms, showers, first aid and medical rooms are of high standard, and the plant has its own laundry. The laboratory, for quality control and technical service, is equipped with the latest in testing instruments and apparatus.

At the luncheon which followed a tour of the plant, Mr Thomas D Cabot, president of Cabot Corporation, Boston, USA, the parent company, said he felt greatly honoured that so many were present. After apologizing for his lack of knowledge of the Italian language, he launched very successfully into a prepared speech in Italian. Mr F. Micheli, undersecretary, Ministry of Industry and Trade, representing the Minister, and Mr Zennaro also spoke. During the afternoon, those who had attended the opening toured the monuments and churches of Ravenna, accompanied by multi-lingual guides provided by Cabot Italiana, to see the mosaics for which the town is world famous.

On the evening of the opening day, Cabot celebrated with a dinner at the Grand Hotel, Castrocaro, which was attended by, among others, Mr J. D. Zellerbach, American Ambassador in Italy; Dr L. Pirelli, vice-chairman of Pirelli; Mr Andre de Loizillon, president of Shell-St. Gobain, Paris; Mr George H. Cash, managing director of Cabot Carbon Ltd., England; Mr P. H. Delacour, president of Cabot Carbon, Canada; Mr Benigno Zaccagnini, Minister of Public Works; Mr Filippo Micheli, undersecretary, Ministry of Industry and Trade; Mr Merryl T. Cootes, American Consul General, Florence; the Prefects of Ravenna and Forli; Dr Martinenghi, Pirelli; Mr H. Mottura, Michelin, Italy; Mr Denis E. O'Mulloy, Cabot Carbon, Berre, France; Dr Abba, CEAT, and Mr Oresi, Edison.

Polypropylene Patent Case

MONTECATINI SUES JAPANESE FIRM

LEGAL action against Shin Nippon Chisso has been taken in Osaka, Japan, by Montecatini of Milan, Italy, for alleged infringement of polypropylene patents. According to a company spokesman, Montecatini took this step after Shin Nippon Chisso showed, by various actions (including the request of governmental approval to its agreement on polypropylene production with the American company AviSun, an exhibition of imported polypropylene goods in Tokyo, and several public statements by its president) that it is resolved to go ahead in its attempt to manufacture polypropylene disregarding Montecatini's basic Japanese patent rights.

Patents covering Natta's discovery of polypropylene, in the course of research activities sponsored by Montecatini, have been taken out in most countries. Licensees include I.C.I. and Shell in the UK, Pechiney and Société Normande de Matières Plastiques in France, and Hoechst, BASF and Hüls in Germany.

In Japan, Montecatini and Professor Herman Ziegler are said to have obtained basic patents and patents covering additional inventions and improvements.

Two firms, Mitsui Chemical and Mitsubishi Petrochemical have obtained Montecatini licences and the relevant agreements were preliminarily approved recently by the Japanese Government.

Several other important Japanese companies desirous to enter into this new polymer field have asked for licences from Montecatini. 'But,' said the spokesman, 'Shin Nippon Chisso did not even try to get Montecatini's licence, but deliberately started from the beginning in a course which Montecatini and several leading Japanese experts firmly believe could but lead to the infringement of Montecatini's patents.'

RR and Australia

Agreements have been signed between The Rubber Regenerating Co. Ltd. of Manchester and a newly-formed Australian Company, The Rubber Regenerating Co. Pty. Ltd. of Melbourne, for the provision of technical, engineering and operating 'know-how.' The Australian company plan to erect a reclaiming plant at Dandenong, Victoria, with an initial capacity of 5,000 tons of reclaimed rubber per annum and hope to be in production by the end of 1961. Rubber Regenerating of Manchester have taken a minority financial interest in the new company, whose other shareholders are Westminster Carpets Pty. Ltd. and Clyde Industries Ltd., both Australian concerns.

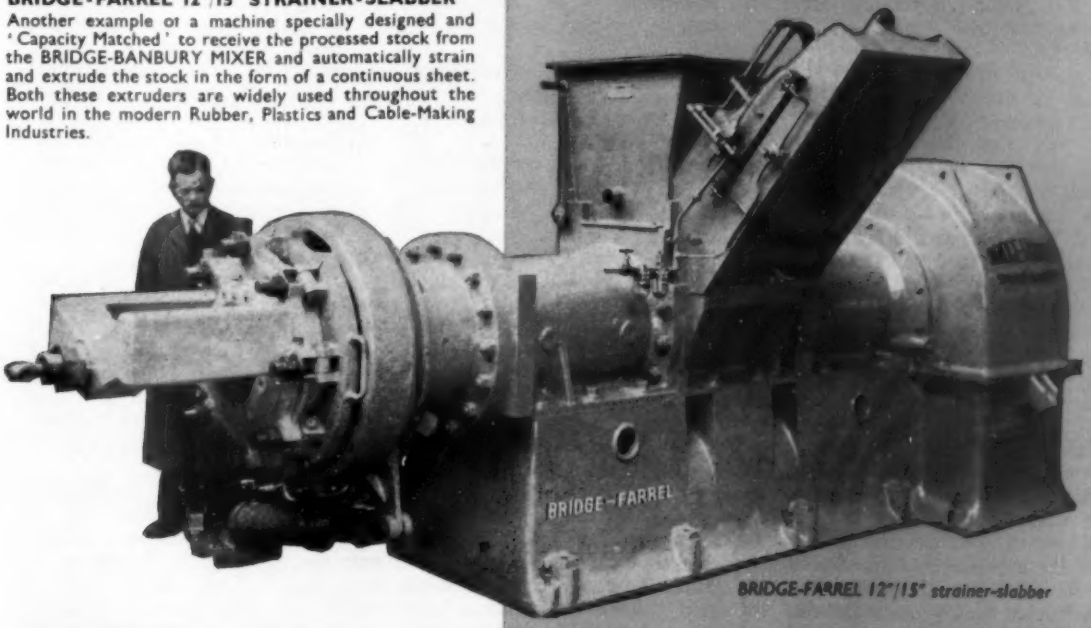
There is a **BRIDGE — FARREL** 'capacity matched'

EXTRUDER for all sizes of BRIDGE-BANBURY MIXER on all types of process . . .

BRIDGE-FARREL 15"/18" Pelletiser

BRIDGE-FARREL 15"/18" PELLETISER
This extruder is specially designed to automatically receive the processed stock from the BRIDGE-BANBURY MIXER and continuously transform the bulky, hard-to-handle masses into small, free-flowing, easy to store pellets.

BRIDGE-FARREL 12"/15" STRAINER-SLABBER
Another example of a machine specially designed and 'Capacity Matched' to receive the processed stock from the BRIDGE-BANBURY MIXER and automatically strain and extrude the stock in the form of a continuous sheet. Both these extruders are widely used throughout the world in the modern Rubber, Plastics and Cable-Making Industries.



BRIDGE-FARREL 12"/15" strainer-slabber

BRIDGE — FARREL "matched capacity" units are world acclaimed as the ultimate in continuous, high-production automated processes

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Plastics Processing Congress

PRELUDE TO THE MACROPLASTIC EXHIBITION

THE congress held in Amsterdam on October 17-19 immediately preceding the macroPlastic exhibition in Utrecht was well attended. The number of registrations exceeded 750 before the start of the congress, and many more arrived on the first morning who had not previously applied. This strained the capabilities of the organizers to some extent, and it was found necessary to delay the proceedings for almost an hour while the late arrivals were dealt with. Nevertheless the rest of the congress went smoothly, and the organizers are to be congratulated on surmounting the obstacles arising from this tremendous response.

After a brief inaugural address by Professor D. J. A. Staverman, president of the congress committee, the first plenary lecture was read by Dr G. A. Kohnstamm, deputizing for Dr J. Overhoff who was unfortunately ill.

The purpose of the congress, he said, was to discuss the technology of plastics processing against the background of the interrelationship between machine and product development which, in fact, went hand in hand and could hardly be separated. He approached the subject from the product side, discussing the aims of processing research and the influence of processing on end product properties. The second plenary lecture given on the following day by J. Butler (BIP Ltd.) stressed the machine development aspects.

It was necessary, said Dr Kohnstamm, to distinguish between thermoplastic and thermosetting materials because whereas with thermosetting plastics part of the 'processing history' of the material was wiped out during the curing reaction when the high molecular weight material was formed, this was not the case with thermoplastics.

In this case the high molecular weight material was processed as such, and in the extreme case, because the 'processing history' was frozen in, the properties of the end-product could be more determined by the processing conditions than by the raw material properties.

Test Methods

Dr Kohnstamm then referred to the test methods which had been developed by national standards organizations, and which were now being built into an international system by the ISO. There was, he said, a danger that the value of the figures obtained might be over-rated as they represented only the behaviour of specially prepared test samples under arbitrarily chosen conditions, and their value was only relative and never absolute.

Many of the standardized methods dated back to the time of the thermosetting industry, which implied that the test samples were prepared by compression moulding. In this way, a fairly good impression could be obtained of the merits and possibilities of an article which was compression moulded from the raw material investigated. The typical processing properties of the moulding powder had, of course, to be investigated separately by moulding tests in special moulds.

If the same system of investigation was used for the determination of the material properties of thermoplastics, the results obtained would be of limited value only. In preparing the samples, a processing method must be chosen. If, based on work on thermosetting materials, compression moulding was applied, there might be no correlation at all with results obtained when applying the processing methods normally used for thermoplastics: injection moulding, extrusion, calendering. It could even be said that for thermoplastic materials it was impossible to obtain data on raw material properties that correlated with properties of the processed article. Theoretically, there were as many 'property data' for thermoplastics as there were methods of processing and possibilities of varying processing conditions. Luckily, in actual practice the situation was not as bad as that. It was, however, necessary to know in detail the processing history of any sample or article before sound conclusions could be drawn from the figures obtained for the various properties.

This, he said, stressed the paramount influence of the processing of thermoplastic materials on their end-use properties.

Processing Research

The study of the phenomena occurring during the processing of plastics, and of their causes could be classified as processing research. The aims of processing research could be summed up as follows:

(a) Improvement of the processing method itself. This would mainly include a study of processing conditions, so that for a given product on a given machine the best results were obtained.

(b) Production of information necessary for plastic raw material product development. — These studies would comprise comparative evaluations of various plastic raw materials and trial lots, so as to obtain specifications for the desired plastic raw materials and, through this, define its manufacturing conditions.

(c) Processing machine research, leading to development of new or improved processing machines. — This was a very important task, which would require especially close co-operation between the mechanical engineer and the plastics technologist.

(d) Improvement of end-use properties.—This part of processing research required detailed studies of orientation and crystallization and their influence on end-use properties.

Dr Kohnstamm then discussed various examples, mainly related to piping, showing the way in which orientation and crystallization during moulding could affect the properties of thermoplastic products and concluded by saying that he felt his treatment of the subject had been very incomplete.

The very interesting development of biaxially-stretched pipe, for instance, formed another striking example of property formation by processing. The whole field of plastic film, which must be considered to be at least as important as the field of plastic pipe, had not been discussed. Of films it could certainly be said that their properties were to a large extent formed during processing. Here correct processing, and especially the various stretching methods, including biaxial stretching, decided the 'to be or not to be' of film or film raw material. However, he hoped that the examples given had sufficiently strengthened his point, that product raw material properties, as measured in the conventional way,

gave a certain definition of the raw material but they were only one of the many factors that decided the end-use properties of the plastic article. The other decisive factors were processing methods and processing conditions. Only an integrated study and a detailed knowledge of product properties, processing conditions and machine possibilities would give the necessary basis for modern plastics processing and would lead to the best technical and economical results for all three parties concerned: the end-user, the plastics processor and the raw material manufacturer.

Challenge to Engineers

The second plenary lecture, delivered by J. Butler, was entitled 'The challenge to be met by the plastics engineer.' To meet the greater and more important targets now confronting the plastics industry, he said, bigger efforts must be exerted to integrate the work of the different sections of the industry. Co-operation between the chemist and physicist and the engineers must begin earlier than had been the case in the past. He described the path of self-help chosen by one group of companies to achieve this and of how this primarily chemical concern, early in its history, faced a barrier to progress in the general methods then in vogue for using its products. How it climbed that barrier by widening its spheres in the engineering sense, and in so doing, built up a team of engineers whose work over the years took them into many wider fields of operation, moulding, tooling, manipulating and machine making, primarily to provide the tools of the trade and a service to assist and broaden the use of the company's products. That policy in integrating the work of the chemists and engineers helped this group to perfect its own original products and processing methods.

Mr Butler mentioned other methods of recruitment to the industry's engineering force: because strength begets strength, the growing importance of plastics had induced outside machine makers to throw their engineering resources into the battle for greater engineering efficiency and co-operation. This had still further widened the horizon of plastics and such firms formed a very welcome addition to our engineering strength. But it took too long to recruit strength that way, such help demanded a guaranteed and immediate return for its effort. It was essential to have a force of engineers of various types who could work against long term projects and force success against odds.

Too Few Engineers

He said that he felt strongly that of the great sciences — physics, chemistry and engineering, the latter had been one which the industry had not fostered enough to bring plastics engineering sufficiently within the umbrella of the industry. In other words, the industry had long sought, educated in a practical sense, and utilized, chemists and physicists to a point where the terms a 'chemist in plastics' or 'physicist in plastics' meant what they said, but that cause had not been adopted in respect of engineers. He claimed that there were not enough engineers in plastics. Most of the engineers who worked for the plastics industry were employed outside the industry which, on the other hand, was self-contained to a very great extent in chemistry and physics. We were becoming too dependent on our friends outside the industry.

'To meet the challenge of the future,' said Mr Butler, 'we must train and employ our own engineers. They must grow, learn and work side-by-side with our chemists so that they know our products from the start — moulding materials and resins — and work on the processing of them in every branch of plastics, from compounding to producing the finished goods, until with a complete knowledge of all the "tricks" of our own trade our own engineers can design and make our own machines and build our own plants.'

In this respect, he said, the larger producers of plastics materials would eventually become able to tailor-make their molecular structures to reach a required target of performance. They would not be willing to face the necessity of altering their structures or formulations to enable them to be processed on adaptations of existing types of processing plant as they have in the past and would find it necessary to evolve, design and build their own processing machinery. As far as concerns the processing of plastics, this was being practised more and more by larger manufacturers who were putting down their own plants for moulding, extruding, vacuum forming, etc., to feed their own assembly lines with the larger run of the less difficult types of plastics articles. He suggested that this feature would grow and its two main effects would be: (1) the processing plant used in this way must become easier to use and must perform its duties more consistently than in the past, (2) the custom moulder, for instance, would gradually become the 'trouble moulder,' for him there would be less and less of the large orders of simple articles produced by manually operated machines. He would be forced to adopt automatic production methods on these jobs in order to meet a fiercer competition. Whilst additionally, as he would always be the expert in his craft, he must use his skills to produce the larger complicated and difficult products, where experience and 'know how' were a first necessity.

To provide the answer for these trends, he concluded, we must look to the engineer. Automation must come in every field and every element of processing and producing.

(To be continued)

Booking for Europlastica

The first UK firm to book space at the Europlastica Fair, which will be held in Ghent next year June 16-25, is Peco (Machinery Sales) Ltd.

Other firms who have made a booking are:

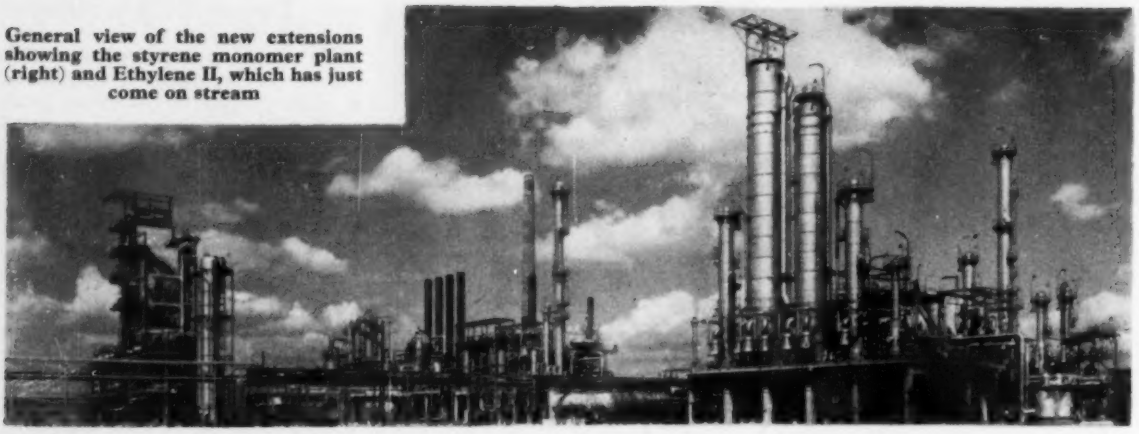
S. A. Printex, Bruxelles; Uitgeversbedrijf Reflex, Holland; Vyackier Frères, Nieuwe Vaart, 49, Ghent; Selchim S.A., 412 Avenue Louise, Bruxelles 5; Fabrieken Alfred Stevens N.V., St. Niklaas, Waas; PVBA Prodin, Sportstraat, Ia, Ghent; Solvic S.A., 44 Rue Prince Albert, Bruxelles 5; Antoniavolet, 29 Rue de Condé, Antoing; Sidac, 801 Chaussée d'Ottergem, Ghent; Ets René Muller, 23 Rue Pourbus, Antwerp; Alplastic-J. Amelincex, Rue J. De Block, Tisselt; Cogebi S.A., 49 Avenue Huysmans, Lot-lez-Bruxelles; Bouilleres Nord et pas de Calais; S.A. Fabelta, 109 Rue de Bruxelles, Tubize; Ateliers de Forest S.A., Forest, Bruxelles 19; Josef Krauss, Koeln, Merheim; and Owen Corning, New York.

IRI Humberside

The first foundation dinner and lecture of the Humberside section of the Institution of the Rubber Industry will be held on November 24 at Hammond's Restaurant, Paragon Square, Hull.

The lecture, by Dr L. Mullins (NRPRA) and Dr W. C. Wake (RABRM) will commence at 8 p.m. It is entitled 'The Trend of Polymer Development for the Rubber Industry.'

Mr Alan T. Storey, an executive director of Storey Brothers and Co. for 23 years, has retired from executive duties, but is continuing as a member of the Board.



General view of the new extensions showing the styrene monomer plant (right) and Ethylene II, which has just come on stream

Expansion Plans at Carrington

SHELL'S £50m. INVESTMENT: ETHYLENE II UNIT ON STREAM

SHELL Chemical, who have spent £25m. at their Carrington plant since 1955, expects to spend another £25m. in the next four or five years. A big proportion of this capital is being put into rubber and plastics.

Late next year the polyolefin plant, with an initial capacity of 30,000 tons, is expected to come on stream. One unit will produce 15,000 tons of high-pressure polythene; the other will produce low-pressure polythene interchangeably with polypropylene. This is one illustration of the flexibility of the plant: development at Carrington generally is proceeding in the direction of increasing flexibility and diversification. For example Shell — in common with some other concerns — is carrying out research in an attempt to find a direct oxidation process for propylene, so that the same unit could be made to manufacture both ethylene and propylene oxides.

Polydienes in 1963

Another major project being undertaken is the polydiene plant, plans for which were announced in March. It is understood now that site-breaking will commence next year. The plant is expected to come on stream in 1963. Both polyisoprene and polybutadiene will be produced. (Polyisoprene is already being manufactured on a commercial scale by Shell Chemical Co. Division of Shell Oil Co. in USA.)

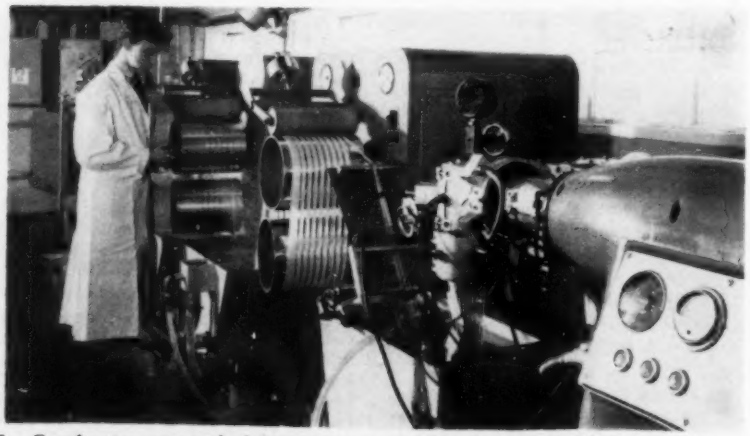
The butadiene required will be obtained from the C_4 fraction in the present Carrington scheme, but it is not disclosed whether the isoprene will be prepared at Carrington, piped from Stanlow, or obtained from some other source.

Ethylene II

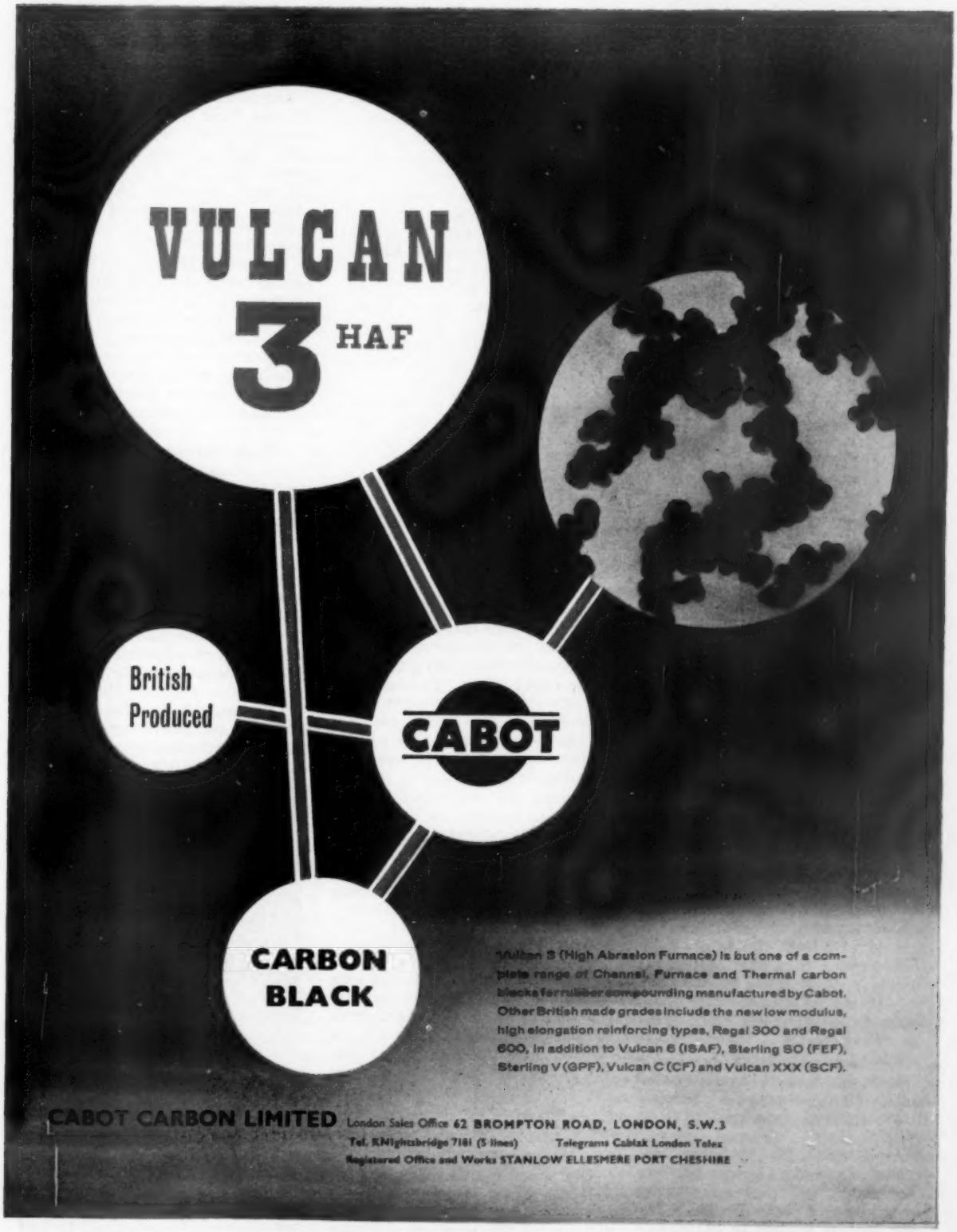
The plant's naptha feedstock is pumped from Shell's Stanlow refinery to units where it is cracked to give a gas fraction rich in ethylene and propylene and a liquid stream with a high aromatic content. The ethylene II unit has just been placed on stream. This is designed to have an ultimate capacity of 55,000 tons of ethylene from a straight run naphtha feed.

In addition to high purity ethylene products, the unit produces debutanized gasoline, fuel oil, a butadiene/butylene product, with propylene and ethane, plus a refinery gas for fuel. Short residence time cracking ensures a comparatively high yield of butadiene.

Naphtha is cracked in Kellogg steam cracking furnaces, using a very low steam to naphtha ratio for optimum yields at minimum operating costs. In order to increase the economy of operations, the effluent from the cracking furnaces is quenched in Dowtherm exchangers and subsequently scrubbed with gas oil to remove entrained polymers and solids. The hot Dowtherm is utilized to generate medium pressure steam. After separation of the heavy ends, the remaining gas is subjected to water and caustic wash, drying, and



In Carrington research laboratory: experimenting with Ziegler polythene monofilament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acetylene removal before passing to the low temperature separation section for recovery of ethylene and other fractions.

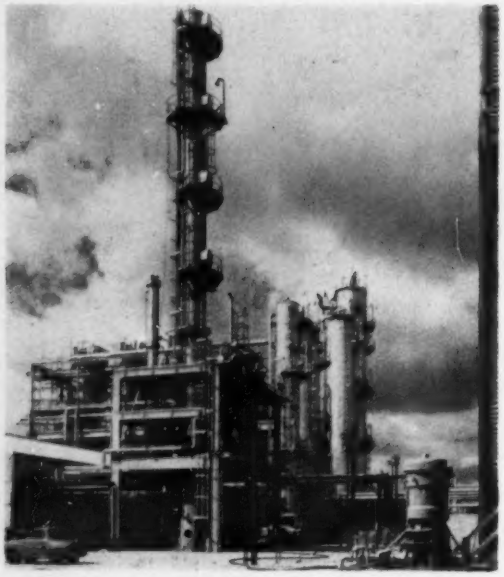
Refrigeration is accomplished using ethylene and propylene as refrigerants, three temperature levels being used in each case, the lowest level being −150°F. A further degree of cooling is obtained by utilization of the Joule-Thompson effect in the Demethanizer. An extensive heat exchange system is employed to keep the refrigeration load to a minimum and thus keep operating cost low.

This unit is the first built for Shell by Kellog International Corporation in the UK.

30% Exported

Carrington's total production of organic chemicals amounts to 140,000 tons a year. 30% of this is exported. Close on 3,000 people are employed, and it is expected that current expansion plans will increase it to 4,500.

The works covers about 250 acres in the centre of an 850-acre estate. 200 acres of this is green belt — but there remains 'a comfortable 250 acres for development.' (*Shell's future position in the polyolefin market is indicated below.*)



The ethylene (direct oxidation) plant

UK Polyolefin Production

When the Shell polyolefin plant comes on stream at the end of 1961, the company will be probably the second largest producer in the UK with 30,000 tons, following I.C.I. The present polythene capacity at Wilton is 105,000 tons; the polyolefin capacity will be lifted to 115,000 tons when the polypropylene plant comes on stream shortly.

In third place may be Union Carbide. Extensions are being carried out at Grangemouth, but the company's present capacity is put at '10,000 plus.'

Monsanto's Fawley plant was expanded recently. Capacity has been increased by 5,000 tons to 15,000 tons of polythene a year. Distiller's present capacity is given as 12,000 tons of high-density polythene.

These figures indicate that the present UK polyolefin capacity is about 150,000 tons; by the end of next year it should be approaching 200,000 tons.

IRI Leicester Dinner

The Leicester Section of the Institution of the Rubber Industry is to hold its annual dinner and dance at the Grand Hotel, Leicester, on Monday November 14. Tickets, 32s. 6d. single; £3 double; can be had from the section's hon. secretary, Mr J. Devlin, B.B. Chemical Co. Ltd., Ulverscroft Road, Leicester.

List prices on several sizes of B. F. Goodrich off-the-road tyres and tubes were increased 2½-5%, effective October 10. Prices of size 16.00 and larger tubes will be increased 5%; size 16.00 and 18.00 tyres up 5%; size 21.00 and larger tyres up 2½%.

TRED 65

Tred 65, the latest rubber reinforcing resin from Monsanto Chemicals, has been developed to cater for the growing trend in footwear of thinner, harder and stiffer soles.

Compared with the existing Tred 50 and Tred 85, which it supplements, Tred 65 is said to make available high reinforcing properties approaching Tred 85, coupled with the easy processing of Tred 50, enabling it to be processed in internal mixers or open mills at normal processing temperatures.

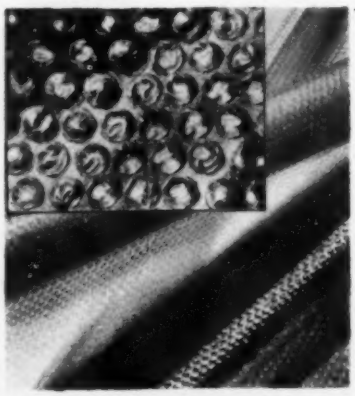
Tred 65 readily disperses under all normal compounding conditions, and its flexibility in formulating enables economies to be achieved by combining with cheaper elastomers in all grades of compounds.

In spite of its high reinforcing properties Tred 65 is still compatible with all oil extended rubbers.

Polythene Cushion Packaging

On show for the first time at the Fresh Food Packaging Exhibition (Alexandra Palace November 1-4) will be Fablothene Airwrap — polythene film incorporating an air cushioning device. Each air cushion is a completely independent unit, and there are twelve of them to each square inch of polythene film. The film is available initially in a 50in. width.

This material provides, therefore, insulating and cushioning properties, allied to the characteristics of standard polythene. It is suitable for lining cartons for soft fruit, for interleaving in chocolate boxes and for packaging delicate items such as china, ampoules, and electric light bulbs.



A conference on management ratios and interfirm comparison will be held in the Council Chamber of the Federation of British Industries at Tothill Street, on November 3.

Synthetic Rubber Symposium

POLYDIENES — CHLOROBUTYLS — FLUORINATED ELASTOMERS

(Continued from October 22 issue, page 688)

THE remaining two days of the symposium were devoted to papers of a slightly less theoretical nature and the first of these on polyisoprene rubber was delivered by Dr F. W. Hannsgen, Research and Development Manager, Synthetic Rubber Division, Shell Chemical Co. In the course of his talk he said that his company had started production of polyisoprene rubbers at a new 20,000 ton plant in Los Angeles within the last few weeks and were building a further plant with a capacity of 40,000 tons elsewhere in the US. He forecast that by the end of 1962 the capacity for stereo regulated polymers or isoprene would be 200,000 tons in America and at least 100,000 tons in Europe and that this capacity with natural rubber should satisfy world demand for natural rubber-like materials until 1965. The significance of the development of processes to make stereo-specific elastomers on a commercial scale was explained in terms of the world-wide supply and demand position for natural and synthetic rubbers. The availability of stereo-regular polymers would assure ample supplies of a raw material for end-uses where previously available synthetics were technically inadequate.

In spite of the striking similarity the analytical data show between synthetic polyisoprene rubber and Hevea, there were certain differences that manifested themselves in processing and handling characteristics, as well as in the final product properties. The narrow molecular weight distribution, for example, created what was termed 'anomalous Mooney behaviour' necessitating small but important changes in compounding techniques.

The versatility of polyisoprene rubber in a multitude of applications was evident by examining its gum and loaded physical properties, as well as through a brief summary of the successful utilization of this polymer by the consuming industry.

Polybutadiene

D. Bulgin, Manager, Physical Research Dept., Dunlop Research Centre, then gave a lecture, illustrated with numerous slides and photographs, showing the results of investigations carried out on the rheological properties of cis-polybutadiene and other polymers.

Cis-polybutadiene in the uncompounded state exhibited a sharp change of properties on the mill at a critical temperature in the region of 40°C. Below this temperature the material milled satisfactorily, but above it the material sagged and crumbled so that there was only a narrow temperature range for satisfactory milling.

An extensive investigation into the cause of this change in properties had been made, involving measurement of the stress and elongation conditions of the material on the mill rolls, tensile tests on the unvulcanized material and flow and recovery experiments on laboratory instruments.

A tentative explanation was that under the stress and temperature conditions in the nip of the mill molecular alignment took place, leading to formation of crystallites which 'melt' above the critical temperature. This was consistent with G. Natta's views on polymorphism in linear polymers.

The two lectures following this were both given in English by visitors from abroad, Dr F. Engel, of Chemische Werke Hüls, and Dr S. Leghisser, of Montecatini, who read a paper of which he was co-author with Professor G. Natta, who was unfortunately prevented by illness from presenting his papers. Both of these speakers and Dr Crespi, who later read his paper (again Professor Natta was the co-author) in English, are to be congratulated, not only on delivering their lectures in a foreign tongue, but dealing with questions afterwards, which must have made many of the English speaking delegates even more aware of their linguistic limitations.

Dr Engel's lecture was on polybutadiene rubber and he discussed the results of mass polymerization of butadiene in a continuous operating polymerization extender, which was a method under development in the Hüls plant which was producing promising results. Based on the stage of development described in a lecture given earlier this month in Berlin (which it is hoped to report in full in a later issue of *RJIP*) another future possibility will be the application of modification methods and the Mooney control in polymerization, for the manufacture of polybutadiene/oil batches. Dr Engel also commented briefly on the field of carbon black masterbatches already in production. The main difficulty was the dispersion of the carbon black which was incorporated at an early stage in the process. Dr Engel was not, however, in a position to divulge any information on this process.

Physical Properties

Dr S. Leghissa discussed the physical and technological properties of cis-polybutadiene. He said that during the last few years, all the four foreseen types of stereoisomeric polybutadiene, each containing practically only a kind of monomeric unit, characterized by the type of enchainment and of steric structure, had been obtained at high steric purity, using different stereospecific catalysts.

Among them cis-1,4-polybutadiene aroused particular interest, owing to its excellent elastomeric properties.

He described the properties and characteristics of a high cis-1,4-content polybutadiene, the synthesis of which could be easily realized on a commercial scale.

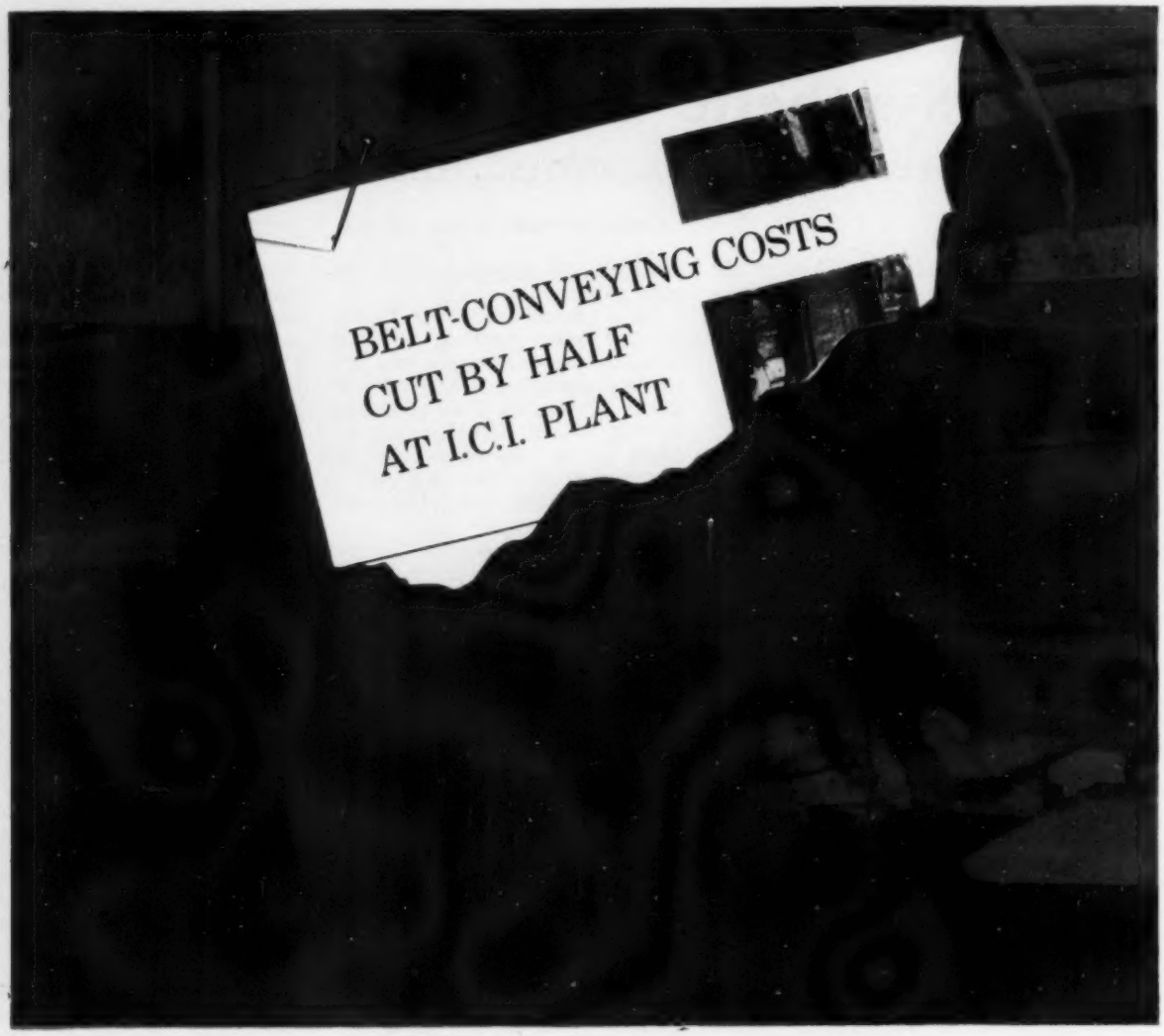
The polymer containing 97 to 98% or more cis-1,4-units, obtained with homogenous catalytic system, showed such structural properties (purity, steric homogeneity, crystallinity, melting range, very low dispersion of molecular weights, etc.) that it marked a sharp differentiation with regard to the other polybutadienes described up to now.

In particular, the mechanical properties in non-reinforced products and the technological properties of workability appeared to be remarkably improved.

Tread Wear

Dr R. G. Banman, Manager, Tyre Research, B. F. Goodrich Co., discussed the tread wear indices of various synthetic elastomers measured in varying severity road tests. The very wide diversity of the wear properties of the newer synthetic rubbers required the development of improved tyre tread wear tests. Tyres had been tested under constant severity conditions which provided rates of wear varying by a factor of 1,000. The

Continued on page 741



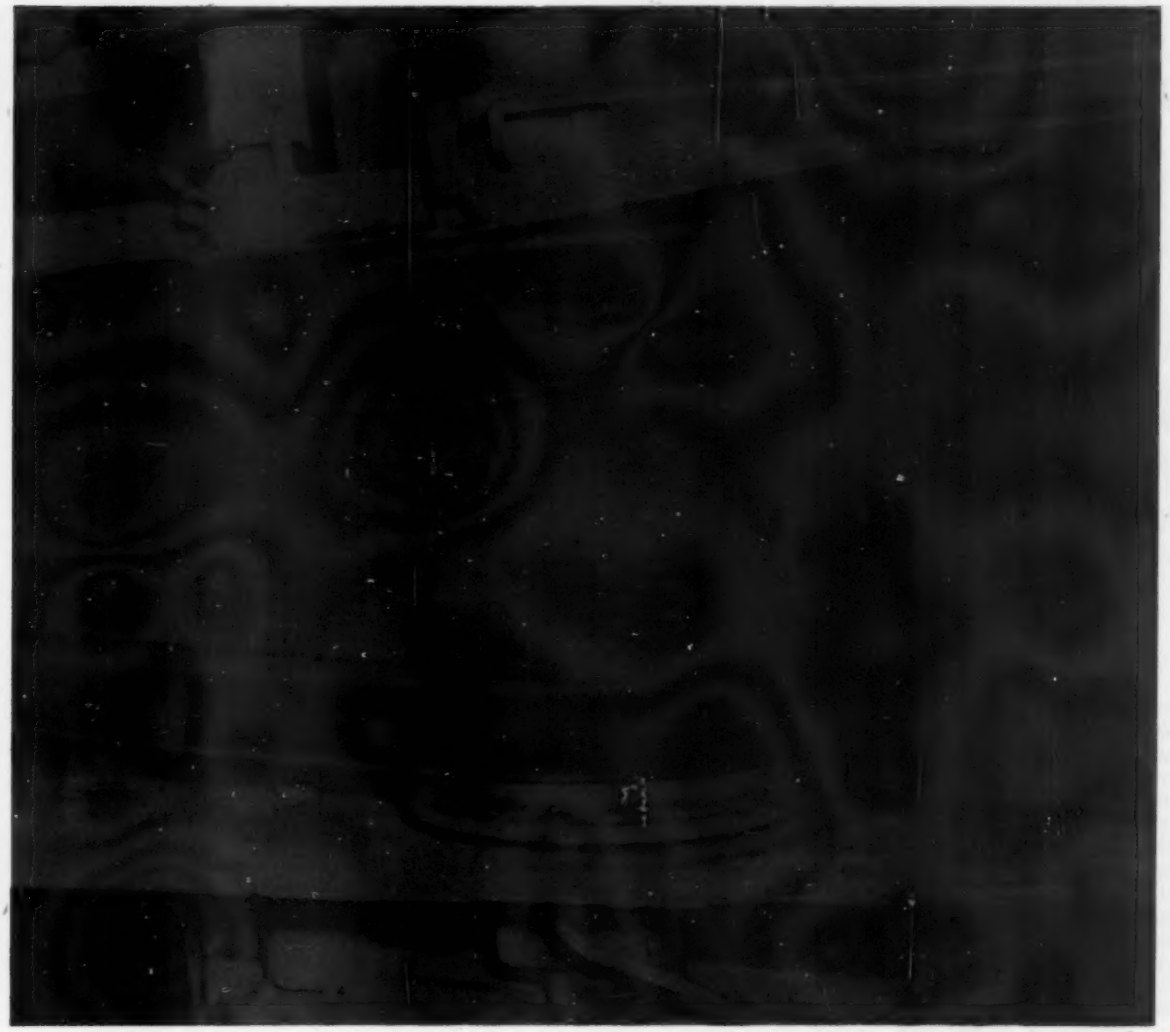
Costs cut–

By installing a Butyl Rubber-covered conveyor belt at their Billingham Chemicals Plant, Imperial Chemical Industries cut the cost of belt-conveying phosphate fertilizer by half.

WORKING life quadrupled

Because of the heat of the fertilizer (about 115 degrees centigrade), its corrosive properties, and the usual damage from moisture and ageing, even the best synthetic rubber belts used previously have worn out in a year, after shifting about 132,000 tons. The Butyl Rubber belt was installed four years ago and has shifted 650,000 tons.

ESSO MEANS BUSINESS IN CHEMICALS



COST still going down

As the Butyl Rubber belt is still in perfect condition, and I.C.I. expect it to work indefinitely, belt-conveying costs will probably fall still further.

When ordering conveyor belting, it will pay you to specify

ESSO BUTYL

Esso Butyl is the man-made rubber with the longest flex life and the greatest resistance to heat, corrosion, ageing, ozone, moisture and tearing. (For handling especially hot materials, Esso Butyl covered belting is even more efficient on a 'Terylene' base.)

Esso CHEMICALS

For information about Esso Butyl Rubber, telephone: HYDe Park 7030, or write to Esso Petroleum Company, Limited, Chemicals Department, 50 Stratton Street, London W1

ESSO MEANS BUSINESS IN CHEMICALS

VIEWS and REVIEWS

NUMBERS fascinate us — especially tens and hundreds. The year 1960 has called forth a more than usually long list of 10-year prophecies, among them a gallant, entirely praiseworthy effort by the Southern Rubber Group, meeting in June 1960 at Birmingham, Alabama, USA.

The subject was 'The Coming Decade in the Rubber Industry' and it is reported in *Rubber World* August 1960. Vol. 142. No. 8. Pp. 129-132. It was a panel discussion with contributions from C. F. Ruebensaal, of Texas-US Chemical Co., on markets; P. W. Cornell, of Goodrich-Gulf Chemicals Inc., on polymers; W. F. Tuley, of US Rubber Co., on chemicals; and H. K. Hochschwender, of Hochschwender and Associates, on processing.

Rubber Mantology

It takes courage to prophesy and, at the sticking point, most of them failed — as most of us would. Their prophecies seem to me to be more suitable for the next 10 months than the next 10 years.

They all extrapolated along obvious lines from current achievements and well-known facts, some more fearlessly than others. None cared to risk a leap, a jump, a mutation, a sport, a really new idea, an innovation. Hochschwender was the bravest.

Our scientists can do wonders: they can diminish themselves to such a tiny size as to stand between the electrons in their orbits and nod acquaintance with the even tinier entities they meet there; they can blow themselves up and launch themselves into space to look behind the moon. But not one of them knows whether he will see tomorrow's sun. Not one of them knows whether, in 1970, vehicles will run on rubber tyres, or even on wheels. A science is missing — prophesology.

We need a Newton, to invent a new branch of mathematics, mantology, concerned with calculating the future, a man who can tell us *when* the apple will fall on his head. Meanwhile, let us return to the enterprise of the Southern Rubber Group in Birmingham, Alabama.

C. F. Ruebensaal, as moderator, opened the proceedings and, speaking about the growth in the use of synthetic rubber, forecast that 1965 would see a usage of close to 80% of the total new rubber consumption. He was concerned about 'the growing confusion with regard to whether or not many of the polythenes, polyurethanes, ethylene-propylene, or polybutene elastomers . . . will be classified as synthetic rubbers or plastics. The problem of proper classification of these and other new materials must be solved in the near future . . .'

New Polymers

Next, Dr P. W. Cornell gave a paper, of which K. Green was a co-author, on 'Developments in Polymer Types — Forecasts for the Coming Decade.' More oil-extension was predicted, and by the use of more expensive extender oils an attempt will be made to come closer to natural rubber. The SBR of the future will have less heat build-up and better tack. SBR masterbatches incorporating finer blacks will be produced by means of the new latex-dispersing techniques, and, as new types of black become available, new types of SBR polymer will be developed to match them. Improved automation will be possible as black masterbatches become more available in crumb form.

Emulsion polymerization will make available new types of polymers, perhaps with a third monomer, perhaps from low-cost isoprene or piperylene, and will make polymers possible with higher tensile strength which will lead, among other things, to cheaper foam rubber. The ability to make latices with larger particles will enable higher filler loading to be used.

Polyisoprene, being already a close match of natural rubber, will exceed natural because research will be directed to enhancing its properties. Cis-polybutadiene has unusual properties and new machinery will be developed for processing it.

Olefin rubbers — for example low-isoprene butyls and ethylene-propylene — will get a big impetus when a more convenient curing system has been discovered.

It will not be more than two years before excellent synthetic matches of natural rubber will be available cheaper than natural. Other new and remarkable polymers are just around the corner, awaiting the necessary years of testing-out before consumer acceptance can be expected.

The Future for Rubber Chemicals

W. F. Tuley spoke on 'Future Developments in Rubber Chemicals and Vulcanization Methods,' and began by guessing at the sums spent on research in this field, pointing out that it takes five years from research to commercial production.

Sulphur is now only one of the cross-linking agents in commercial use; sometimes the new ones give improved properties or even transform the material as peroxides convert polythene into an elastomer. Tuley prophesied increasing use of non-sulphur vulcanizing agents; they can often broaden the time-temperature range of curing, a useful achievement as today's trend is towards higher temperatures to attain lower times.

There will be improvements in ease of handling: for example, more masterbatches, the development of free-flowing, non-dusting powders, and new surface treatments which will improve wetting, dispersing, and incorporating processes.

The Future in the Factory

Nothing sensational so far, all fairly routine estimating; like deciding how much milk to take tomorrow. But somebody must have crossed Mr Hochschwender's hand with silver for he does step out a bit more. Written in conjunction with G. V. Kullgren, vice-president of Hale and Kullgren Inc., this paper entitled 'Projected Advances in Rubber Processing,' was the most stimulating of the quartet, though it too was entirely based on current know-how. 'In many instances the equipment, both electronic and mechanical . . . can be found in isolated departments in a variety of plants all over the country.'

An attempt was made to visualize a tyre production plant in the year 1970, incorporating the maximum of mechanization and using electronic computers as planning and actuating instruments. The overall planning would be carried out by a general-purpose computer, 'The Big

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **F. C. JENNINGS**

Thinker,' into which would be fed the orders which would be processed by means of memories and feed-back servos. Not only would the 'Big Thinker' calculate whether the order would be filled from stock (and under this system stock would be small) but would prepare the production schedules for all the parts of the plant.

Mixing to Electronic Schedule

'The millroom of the plant will have its mixers completely controlled by electronic scheduling equipment, and many of the ingredients have previously been incorporated into the rubber in the synthetic rubber manufacturing plant. The remaining additives, such as sulphur, accelerators, antioxidants, etc., will be combined into a masterbatch of pastelike constituency to facilitate metering through fluid pumps.' I have no doubt that engineers will have a few pertinent questions to ask and difficulties to bring forward, but here is a reasonable ideal for them and they have 10 years to work in.

Mixing of the tyre stocks will be synchronized with the requirements of the calenders and extruders by specialized computers which will also change stocks as necessary, arrange for fabric to be delivered from mechanized storage to the operating system, and control the bias-cutting. For servicing the extruders, there will be continuous measurements and control of stock plasticity and temperature, 'automatic booking and storage of treads into an electronically dispatched conveying system to deliver the proper tread to the proper building machine at the proper instant that it is required . . . As an added refinement, it is entirely possible that there would be a good system for injection moulding the tread and sidewall to the carcass in the curing mould.'

Now we are beginning to get somewhere. A 10-year process-development programme is starting to emerge.

Automatic Tyre Building

'The common use in plants of the future of the unattended automatic tyre building machine is expected. Preloaded servicers would come from the calendering process; treads would be supplied from the tread magazines, and the other materials from preloaded magazines arranged for electronic dispatch.' That sounds good to me, and allowing a bit here and there it does not sound impossible for 1970. I confess I began to worry when I read the next part of the prophecy.

'A moderate amount of in-process inventory would be required at this point, but it will have been exactly predetermined as to product mix and will be completely in balance as to the differential in the production cycle of the preparation and assembly machinery.' Will it? And just suppose, I beg of you, that a transistor packed up, or some carbon black got into a switch. But maybe there is a computer (blessed word!) to watch the computer. Let us go on.

'Storage would be located behind or next to the presses with an indexing system, and the press will reach out with an arm to load and unload itself. The curing press of 1960 needs little further refinement to permit computer controlled operation, and, here again, the storage and the amount of space required will be predetermined by the computer in terms of the sales demand on the plant.

'Continued progess in mechanization will permit the plant of the future to include automatic finishing, inspection, packing, and warehousing, and the mechanized warehouse will fill sales orders in response to impulses initiated from suitable computer inputs.'

Hochschwender and Kullgren deserve congratulations for this bold picture, although they point out that from 'the purely technical manufacturing equipment standpoint in the rubber industry, we are almost ready for this plant of the future.' In itself the paper is no mean technical achievement, had they left it there, but they added what, in my opinion, is their most valuable contribution. It was this: 'It is in the phase of management thinking with reference to the concepts of organization and management philosophy that there is the most serious lag. Until organization practice catches up with technical developments, the most efficient integration of our modern technical equipment and our modern computers in our plant of the future will not occur. The development of the management concepts necessary to operate the plant of the 1970's is the phase which requires the most extensive planning and the hardest work . . .'

A Synthetic Future

The striking feature of Hochschwender's talk is that it presents a picture of the rubber industry as a closely integrated whole which is far larger than the sum of its parts. That, for better or worse, is the mood and message of modern science and technology. Analysis has served science well but synthesis is more powerful; we are only dimly aware of its implications.

It implies, for one thing, growth and change. We can be quite certain that in the next 10 years things will not stay as they are. Management will not find it easy to accommodate itself to changes in materials and processes at the rate of change which now seems likely, and even more difficult will it be to be ready to modify methods of organization and business philosophies in order to take full advantage of technical innovation. Yet all that may well be demanded.

The rubber industry will not be alone in this of course; the trend to synthesis, integration, and unification is going on everywhere in all industries.

Technological innovation has already had its impact on business and evoked varied reactions which may serve as models for the future: increased precepts and status for research and development, production automation, office mechanization, advertising and market research, consumer credits in one form or another, packaging, chain stores and supermarkets, are all examples of commercial responses to the new technical challenge. They indicate an awareness of change and a readiness to import into commercial policy the freedom of experiment, trial, and thinking which the scientific attitude demands.

But the challenge of tomorrow goes further. It demands a new philosophy and a new system of education. We have never had it so good; we must begin to think in terms of riches not shortages, to plan for prosperity, to learn how to dispose of wealth. New incentives will be called for, new leisure interests required.

On the human side, industry will ask for less and less brute force, more and more controlling skill in the hands of the users of power-driven tools and machines, and not less, in the minds of management. There will be new social groupings in which the trained and able will be more sharply distinguished from the untrained, and purpose will have more reward than drift.

CHARLES JENNINGS

MEN and MATTERS

A Review of People and Events

by Peter Richards

VISITORS from the UK, the USA, France and Canada, as well as from many parts of Italy were royally entertained by Cabot Italiana at the opening of their new carbon black plant at Ravenna, Italy, last week. Sleek, smooth — what a change — sleeping cars brought many of them from Milan and Rome to Ravenna and then along the company's private siding right into the plant itself. They were welcomed by the general manager, Silvio Zennaro, and by Thomas D. Cabot himself, who had flown from Holland for the occasion.

The opening day was a time of contrasts. In the morning, visitors viewed the fine new carbon black plant whose products include one of the latest oil furnace blacks, the revolutionary Regal 300. A plant which is the most up-to-date of its type using the most modern 1960 scientific processes and machines. Then in the afternoon Cabot Italiana's guests were shown round Ravenna's marble-columned churches to see the famous, almost fabulous, mosaics dating back 2,000 years and more. Any neck-ache suffered by these gazers at the fascinating past was eased by a speedy return to the present at a reception and dinner given by the company in nearby Castrocaro. A memorable day finished with a dash — and in Italy that means something — back to the special Cabot train waiting at Ravenna to take visitors to Rome and Milan. All in all, an occasion that will not easily be forgotten.

Brass But No Muck

A Yorkshireman still believing in the phrase 'where there's muck there's brass,' might be suspicious enough to wonder if Shell were making any money at all out of their Carrington plant.

A visit to this modern petrochemical plant (which has probably grown another acre between my writing this and you reading it) would revise the conventional view that describes industry in terms of sprawl and dirt. The whole atmosphere of Carrington, with its shining towers, tanks and vessels, is one of cleanliness and precision.

The company has brought employment to the district without polluting it. Some of the factors that help to prevent air pollution are complete combustion furnaces; vacuum/pressure regulators for liquid storage tanks to prevent vapour from escaping into the air; and mechanically sealed glands on all pumps.

An 'observer corps' has been recruited from the staff and their families to act as quick spotters of any complaints. In fact, at Carrington, Shell have not only built up good labour, but also good neighbour relations. (*A report on Carrington's expansion plans appears on page* 728.)

Dip. Tech.

Women these days do a lot of jobs their mothers never did — and the number of occupations that are exclusively male shrinks every year. You wouldn't think, for example, that technology was a woman's field, but Miss Mary Chambers is the second woman to get her Diploma of Technology. She took her course at Brunel, and is the first woman to get a 'Dip. Tech.' with first-class honours.

Another point of interest about this year's awards is that there are now some Welsh 'Dip. Techs.' First diplomas at the Welsh College of Advanced Technology were awarded to eleven students.

Among the students who gained awards this year were: Kevin Westman (BX Plastics Ltd., and C. C. Wakefield and Co. Ltd.); John H. Williams (C. C. Wakefield and Co. Ltd.); Roy Baxter (Telegraph Construction and Maintenance); James Hawkes (Portland Plastics Ltd., Uni-Tubes Ltd., and Yarsley Research Laboratories Ltd.), and Douglas Radlett (BICC). All studied at the Brunel College of Technology.

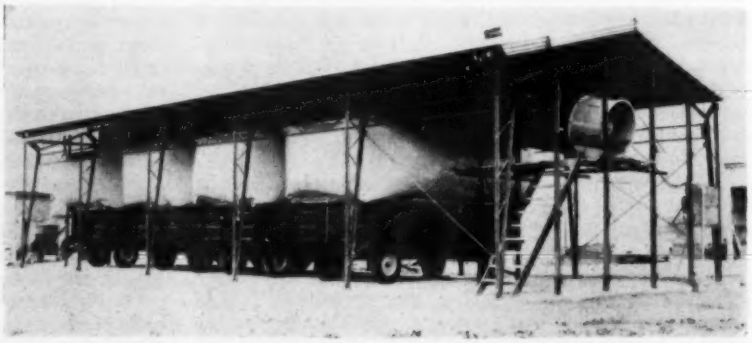
Good Plastics Design

To encourage young craftsmen to produce good designs in plastics, the Worshipful Company of Horners is to make its annual award to the winner of a competition now being organized on their behalf by the British Plastics Federation.

The 100-guinea award — double the value of last year's — will be presented at a forthcoming dinner of the Horners Company, to the craftsman submitting the most striking design in plastics material. Entries should consist of a perspective sketch; a written description and the proposed method of manufacture; and a working dimensioned drawing of the plastics parts.

The age limit for entrants in this year's competition has been raised from 30 to under 35 on December 2 1960. Competitors must be residents of Great Britain or Northern Ireland.

Copies of the regulations and entry forms can be obtained from the British Plastics Federation, 47-48 Piccadilly, London, W.1, to whom entries should



A vinyl coating based on the Goodyear Chemical Division's Pliovic WO is helping US farmers solve grain and hay drying problems outdoors. Using a crop drier, grain and hay can be dried by the wagon load under nylon hoods coated with the resin. Cooley Inc., Pautucket, Rhode Island, USA, producer of the coated fabric, say the vinyl can be fused to the nylon at low temperature without weakening the basic fabric

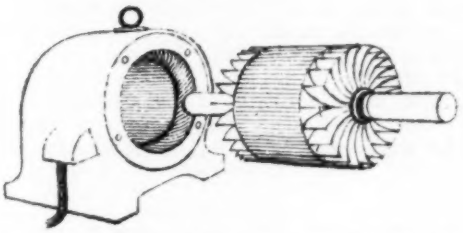
Electrical Aids in Industry *Data Sheet* **No. 14**

Electric Motors & Controls 1

Most manufacturers today employ electric motive power through individual drives, which, among their many advantages, permit the right type of motor to be used for each of various types of machine. The range of motors available—each with its own characteristics–is very large, and the factory executive could well be guided in his choice by the expert views of the motor manufacturer, the installing engineer or his Electricity Board's engineer. The characteristics of the main types of motor are briefly summarised below.

Squirrel-cage Motors

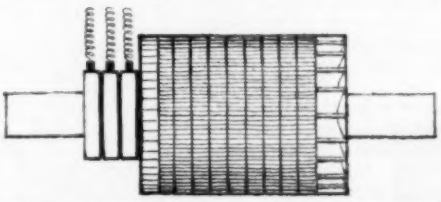
These are the most straightforward and simple in design, and are therefore relatively cheap and robust in character. They should be considered for general duties and, in conjunction with variable-speed gears or couplings, for applications requiring variable speeds, e.g. for crane drives. Small sizes can be switched direct-on-line.



The squirrel-cage motor is very suitable for individual drive of each motion of single-purpose machine tools where the motor horsepower can be precisely specified. It is suitable for driving pumps, fans, lifting hoists and woodworking machines. Textile machinery represents another field of use.

Slip-ring Motors

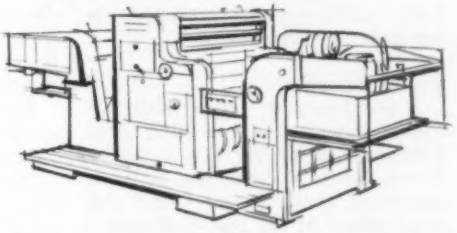
The chief advantage of the slip-ring motor is a very low starting current for a given torque, e.g. full-load torque at starting with a current about 10% above full-load current. This makes it suitable for applications requiring a prolonged starting period with a



load of high inertia. It also permits of speed variation below synchronous speed, though with some loss of efficiency. Typical applications include fans, pumps, heavy lathes, grinders and boring mills, as well as calendering machines, cable-laying-up machines and mine hoists.

Three-phase A.C. Commutator Motors

The main characteristic of this type is variable-speed with uniform and gradual acceleration and good efficiency over the speed range. Paper manufacture provides excellent examples of its use, e.g. in paper-making, reeling, cutting, calendering, coating and drying.



A.C. commutator motors are recommended for mechanised bakeries and for cranes and hoists where very slow speeds are frequently needed.

Synchronous Motors

These are constant-speed motors. One particular advantage is that they can be operated at unity or even at leading power factor to correct a system suffering from lagging power factor, and perhaps so qualify for a reduction in the electricity bill. Pump and compressor drives are typical uses to which they can be put. They are also used in motor-generator sets.

Single-phase A.C. Motors

In general, single-phase motors are used in light industries for drives not requiring more than about five horsepower or where a three-phase supply is not available. While their use is mainly limited to work of a light nature, they do fill a need in such duties as sewing-machine drives, portable hand tools, window opening and closing gear, etc.

Direct Current Motors

For a completely unfettered performance where wide ranges of speed variation, high rates of acceleration and powerful dynamic braking are all-important, the D.C. motor is unrivalled. This means in effect the installation of an A.C.-D.C. motor-generator set or rectifier to give the necessary supply, but the increased cost may well be compensated by the improvement in productivity. When variable voltage is applied to the armature, a wider speed range is obtainable than with any other type of motor. Typical applications of the D.C. motor are: cranes, haulage and tippler equipment, certain machine tools requiring a large speed range and smooth acceleration, high-speed printing and steelworks drives.

For further information, get in touch with your Electricity Board or write direct to the Electrical Development Association, 2 Savoy Hill, London, W.C.2. TEMple Bar 9434.

They can offer you excellent reference books on electricity and productivity (8/6, or 9/- post free)—"Electric Motors and Controls" is an example.

E.D.A. also have available on free loan within the United Kingdom a series of films on the industrial uses of electricity. Ask for a catalogue.

7914

also be sent. The competition closes on December 2 1960.

Buyer Retires

Dr C. Damiano, for many years head of the central buying office of Pirelli Ltd., has retired on reaching the age of 65.

Dr Damiano joined the company in 1918 and became responsible for purchasing for the international, Italian and British Pirelli organizations. He joined the board of Pirelli Ltd. in 1958, a position which he will continue to occupy.

Elastic Expansion

A few issues ago (September 24) I wrote about Ireland's new Industrial Revolution, which has been caused by factors such as generous financial assistance, cheap labour — and full employment in the rest of Europe.

Now I hear that Clutsom and Kemp Ltd., of Coalville, Leicestershire — one of our largest elastic manufacturers — is to start an enterprise in Northern Ireland.

As a result of a pooling of technical knowledge with the Darlington Fabrics Corporation of New York, the English company will carry out the covering of rubber thread in a factory now being built by the Northern Ireland Ministry of Commerce at Carnmoney, near Belfast.

Production is expected to start early next year, with an eventual labour force of 300 to 350, mostly men.

A spokesman for Clutsom and Kemp told me: 'From this close link with the Darlington Fabrics Corporation much expansion may be expected.'

Life-Saving

A man whose war work helped to save thousands of lives retired recently from the position of sales secretary of the General Rubber Goods Division of Dunlop Rubber Co. He is Norman Jones who, on the outbreak of war, was switched from developing the sales of Dunlop floorings and made responsible for fulfilling all Admiralty contracts.

From the Dunlop plant at Cambridge Street, Manchester, where Charles Macintosh founded the rubber industry over a century ago, Mr Jones was responsible for a flow of life-saving devices which included special gear to beat the magnetic and acoustic mines, 'bags' of air which were built into the artificial 'Mulberry harbour,' frogmen's outfits, breathing apparatus and giant pneumatic wave controllers.

Mr Jones joined Dunlop 27 years ago. He was originally destined to be an accountant and after service in World War I, worked for a while in Rio de Janeiro before returning to this country for domestic reasons and joining Dunlop at Cambridge Street.

Despite the demands of his wartime job, Mr Jones found time to help train ATC cadets and remained Adjutant of 429 Squadron ATC until hostilities ceased. He was appointed Sales Secretary in 1951 and held this position until his retirement.

Baker Perkins Contract Out

Employees of the Baker Perkins Group who are members of its staff and works pension schemes, are to be contracted out of the State graduated pension scheme, which comes into operation next April. Contracting out is to be made possible by the establishment of a new pension scheme — the Baker Perkins (Q) Qualifying Scheme — in conjunction with an adjustment to the benefits and contributions of the existing pension schemes.

The net result is that for each year of contributory service after April 1961 the members will be provided with additional pension at the rate of 10s. per annum without being called upon to make any additional contribution.

* * *

M. E. Pickett, Jun., has been made a vice-president of Columbian Carbon (Canada) Ltd. and general manager of its carbon black and pigment division. C. M. Croakman will continue as vice-president in charge of sales of the division. Columbian Carbon (Canada) Ltd., a wholly owned subsidiary of Columbian Carbon Company of New York, is currently building a carbon black plant in Hamilton, Ontario, Canada.

Question Corner — 141

(Second Series)

466. What factors need to be considered in the flat film extrusion of polythene?

(Answer next week)

Answer to Question Corner — 140

465. The following properties appear to be desirable for a polythene resin when it is to be used for paper coating.

(1) *Uniformity* of the resin makes for even coating distribution. In high speed coating non-uniformity may cause voids in the coating due to surging of the melt feed.

(2) *Heat Stability* is very necessary owing to the high operating temperatures which tend to cause oxidation, polymer degradation and possibly the development of a slight odour in the polymer.

(3) *Grease Proofness.* This may be improved by using high density, or low melt index resins. It is also improved by coating at slightly slower speeds, but this depends on whether a somewhat higher price can be tolerated.

(4) *High draw-down* resulting in minimum coating weight and maximum speed of operation. This property improves with increasing density and, possibly, with increasing melt index.

(5) *High density* is useful because it improves the moisture resistance, moisture vapour resistance, grease resistance stiffness, impermeability to oxygen, strength and chemical resistance.

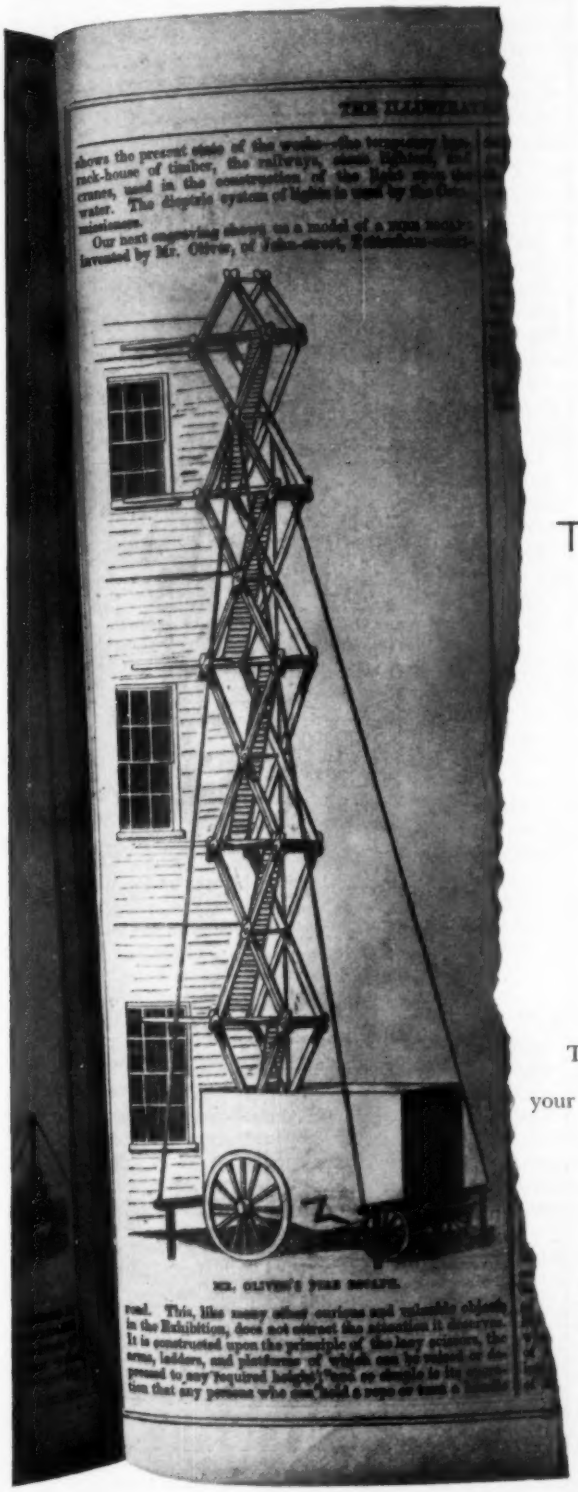
(6) *Beading* cannot be entirely eliminated but it can be reduced by choosing the proper resin, preferably one with a low melt index and low density, but other requirements have to be considered, such as speed.

(7) *Scuff Resistance* necessitates good tensile strength, stiffness and surface hardness.

(Another question next week)

Polly Ester Says . . .

'Bonding agent—that chap at the registry office'



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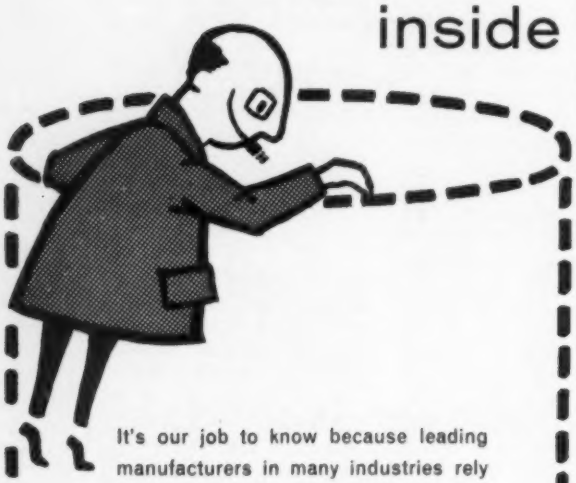

It's our job to know because leading manufacturers in many industries rely on us to weave just the right foundation fabric for their particular products. We've been weaving at **Hay & Robertson for over 100 years,** and this accumulated experience plus our highly geared organisation of craftsmen and technicians offers you the most comprehensive and dependable foundation fabric service available to industry today. Whatever your fabric requirements or problems consult Hay & Robertson first for the right answer quickly.

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SYNTHETIC RUBBER SYMPOSIUM

Continued from page 731

lowest severity of wear employed for these tests was obtained in straight ahead driving at a constant 40mph and the highest severity by cornering continuously at a centripetal acceleration of 12ft./sec^2.

The relative tread wear of two compounds was affected not only by the average severity of a given road test, but also very markedly by the particular combination of severities encountered as the car accelerates, decelerates, corners, or travels at constant speed. Because of the combination severity effect, two road tests may result in widely different wear on test tyres of identical construction, even though the control tyres show the same loss.

Cis-polybutadiene—natural rubber blends showed remarkable abrasion resistance particularly under conditions of moderate and high abrasive severity. SBR was also known to provide some improvement over natural rubber in the same range of severity. On the other hand natural rubber showed relatively less wear at very low severity. Consequently, in order to provide an adequate evaluation of a new rubber, the wear tests must combine a carefully controlled range of severities which are related to their ultimate application. Only from information obtained in this manner could new polymers be used in tyre treads to the best advantage.

The results of a study of carbon black structure effects in synthetic rubbers were then discussed by E. M. Dannenberg, Director of Carbon Black Research, Godfrey L. Cabot, Inc.

The objectives of this study were to estimate the relative degree of primary structure characteristics of carbon blacks and to determine the effect of changes in this property on rubber performance. Relative differences in primary structure influenced oil absorption and dry compression void volume measurements and, in unvulcanized rubber mixtures, influenced extrusion die swell and plasticity. The stress-strain behaviour of vulcanized compounds could be drastically altered by structure changes. Extreme lowering of structure resulted in difficult dispersion behaviour which could be partially overcome by special mixing techniques. Whereas moderate structure lowering from the levels of presently used blacks was desirable for certain applications, the extent to which this could be done was limited by dispersion difficulties and loss of reinforcing ability.

SBR Viscosity

The paper given by Dr E. W. Duck, Kininklijke / S h e l l Laboratorium, was on the relationship of intrinsic viscosity to the intrinsic vistex viscosity and plasticity of cold styrene-butadiene rubber.

The primary evaluation of unvulcanized styrene-butadiene rubber samples involved the determination of the intrinsic viscosity (IV) of the soluble fraction of the dry rubber, or the related intrinsic vistex viscosity of the latex, and determination of the percentage gel present.

A good correlation was found between IV and vistex, namely: intrinsic vistex M 0.75 (IV).

Another useful characteristic was the Hoekstra plasticity, which could be determined on very small rubber samples (about 1 gr). A linear relationship between the inherent viscosity (taken instead of the intrinsic viscosity in this part of the work) and the Hoekstra plasticity was found for cold styrene-butadiene rubbers of low gel content:

Inherent Viscosity (M IV)=0.0326 (Hoekstra)+0.808. This relationship appeared independent of conversion over a large range (27 to 93%), and at the normal conversions 60 to 65% it was also independent of the degree of modification and of the emulsifier employed.

Comparative measurements of Hoekstra plasticity and Mooney viscosiy, which required larger samples, were given for S-1,500-S type rubbers prepared to conversions in the range 60 to 65%.

Ethylene-Propylene Copolymers

The third day opened with the second paper in the symposium for which Professor Natta had been responsible and as previously mentioned this was read in English by Dr G. Crespi, co-author of the paper, on the vulcanization and elastomeric properties of ethylene proplyene copolymers.

The copolymers obtained with some active catalysts, with anionic co-ordinated mechanism, showed a statistical homogeneity, had a regular linear head-to-tail structure and an easily regulated high molecular weight.

Owing to their visco-elastic properties, they must be considered as very interesting raw materials, suitable for several applications in the elastomeric field.

Excellent rebound properties, very low brittle point, together with high ageing stability, connected with their chemical nature of substantially saturated hydro-carbons, were the most significant characteristics of this new type of elastomer.

The crosslinking of ethylene-propylene copolymers, owing to their saturated nature, could not be effected by the usual methods, employed in the field of unsaturated synthetic rubbers, unless a certain number of double bonds were introduced in the macromolecule free radicals (produced using non-volatile organic peroxides) especially in the presence of small amounts of sulphur, allowing crosslinking of these new saturated elastomers, operating under thermal conditions, which were very similar to those usually employed for other rubbers. The addition of sulphur gave better curing yields in respect with the employed peroxide, and gave rise to a higher crosslinking degree.

Data on the physical and chemical properties and on the chemical and ageing resistance of rubbers, obtained from ethylene-propylene copolymers, cured in the presence of reinforcing agents (carbon black, silica, etc.) were reported in comparison with other elastomers.

Chlorinated Butyl

The preparation and properties of chlorobutyl rubber were described by Dr F. P. Baldwin, Esso Research and Engineering Co.

Studies of the chlorination of butyl rubber with elemental chlorine at about 25°C. reveal that the primary and preferred reaction was one of substitution at the isoprene residue. The reaction was very sensitive to halogen level and, unlike bromination, chlorination beyond one chlorine atom per isoprene residue, led to rapid polymer degradation.

The incorporation of reactive allylic chlorine into the butyl rubber molecule provided for numerous vulcanization modes. Crosslinking could be effected not only by conventional sulphur/accelerator combinations but also by bis-alkylation reactions. Zinc oxide and certain organic zinc salts also were effective crosslinking reagents.

Because of the diversity of curing methods available, vulcanizate properties could be made to vary widely. Co-vulcanization with and adhesion to other rubbers were possible, and compounds having excellent resistance to dynamic flexure and heat exposure were readily prepared.

The increase in cure rate and the new range of cured properties available with this rubber foretold expanded application areas for butyl type polymers. Impermeable tubeless tyre innerliners, protective veneers, heat resistant belting and hose, non-contaminating tubing and tanks and

miscellaneous quality mechanical goods items were examples.

Nitrile Rubber

The history of the development of nitrile rubbers was traced up to the introduction of low temperature types in Canada in 1950 in the paper by I. W. E. Harris, Polymer Corporation Ltd. The basic properties controlling the behaviour of nitrile rubbers were discussed with special reference to the effect of non-polymer components on the colour and curing behaviour of the rubber and the effect of Mooney viscosity and acrylonitrile content on the processability and vulcanizate properties.

Polymer-polymer incompatibility and the consequent presence of one polymer component as a micro-disperse phase was shown to improve processability and, in some cases, the vulcanizate properties. Examples of this phenomenon were drawn from the application of rubbers as plasticizers for thermoplastic resins and the use of a crosslinked nitrile rubber as a processing aid. Compounding principles that provide improved heat resistance and ozone resistance were briefly mentioned.

High Solids SBR Latex

E. L. Borg, Naugatuck Chemical Division, US Rubber Co., described the production of high solids SBR latex by a chemical method of agglomeration.

For many applications, particularly in the manufacture of foam sponge, a high solids, large particle synthetic rubber latex was required. The polymerization of such a latex was slow and costly. In contrast, the polymerization of the small particle synthetic rubber latices was rapid. The small particles in a latex taken from a rapid polymerization could be agglomerated to the large size required in high solids applications.

Certain high molecular weight chemicals would promote latex particle agglomeration. Polyvinyl methylether was particularly effective and its utility was enhanced by a close control of its molecular weight and structure. A practical application of polyvinyl methylether to the post-polymerization agglomeration of a small particle SB-R latex had been made. A commercial large particle, high solids latex was produced in this way. This latex was particularly useful in the manufacture of foam sponge and for other applications where its features of large particle size, high solids, and low viscosity were desirable properties.

A paper given by R. E. Headrick, Wright Air Development Division, discussed the research efforts by the USAF on elastomers and compliant materials for use in advanced design flight vehicles. This was specifically concerned with the behaviour of elastomers under a wide variety of environmental conditions, including extremes of temperature and pressure, nuclear radiation, and resistance to the degrading action of solvents and chemicals including the various liquid fuels and oxidizers. Tailor-made polymers were considered as one important approach for the development of rubber compounds for these extremely complex problems. A few of the more promising new elastomeric polymers being investigated by polymer chemists were discussed, pointing out the inherent problems and limitations of the polymer systems. The importance of polymer research was emphasized as the only approach for the achievement of the 'Ideal Elastomer.'

Fluorocarbon Elastomers

Dr J. F. Smith of E. I. du Pont de Nemours Inc., presented a paper on the mechanism of post cure of Viton A, a fluorinated elastomer manufactured by his company.

The presently available methods of vulcanization of 'Viton' A fluoroelastomer, he said, all required a long, high temperature post cure in order to develop optimum properties. The necessity for the post cure was explained in the following way: The formation of crosslinks during vulcanization was accompanied by the elimination of HF from the polymer. Reaction of HF with magnesium oxide present as acid acceptor then formed water which acted to inhibit the full development of cure unless it was removed from the vicinity of the polymer by a post cure in an open system. Measurement of the rate of elimination of water from the polymer served as a method of following the development of crosslinks during cure. Approximately two moles of water, derived from four moles of hydrogen fluoride, were associated with the use of one mole of diamine curing agent. This ratio was confirmed by independent estimates of the relationship of crosslink density to curing agent level, made by measurements of swollen compression modulus.

Silicone Compounding

The last paper on silicone rubber compounding was by P. C. Servais of Dow Corning Corporation and Dr I. H. Riley, Midland Silicones, whose two companies are closely associated in the silicone field.

This paper discussed the advantages and disadvantages of silicone rubber compounding by rubber processors and the reasons for the increase in this aspect of silicone business.

A comprehensive review was made of the materials available to the processor and indications given of the ways in which the properties of the rubber could be changed by suitable choice of fillers, additives and curing agents. The relative merits of compounding from gum or gum-filler masterbatches were discussed.

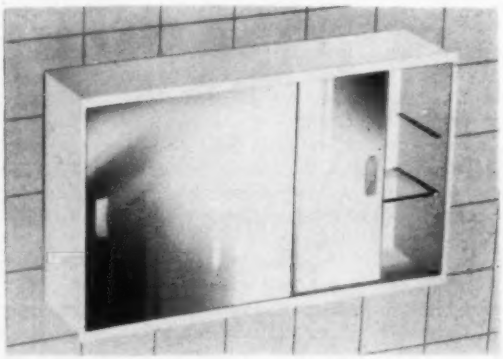
A brief description was given of the equipment required for silicone rubber compounding and the recommended methods of working.

The symposium, which was organized by *Rubber and Plastics Age*, ran smoothly, and as Viscount Hailsham said in his opening speech, made possible a frank interchange of ideas and knowledge.

P. B. Cow

On October 31 the London Sales office of P. B. Cow and Co. Ltd. will move from Hay Hill to Liverpool Road, Trading Estate, Slough, Bucks.

This move is part of the expansion programme following the company's acquisition of St. Helen's Cable and Rubber (*RJIP* May 7, 692). Production of existing products is being increased, together with a number of new interests, which include a tank-lining project.



The new Ekco Plastics bathroom cabinet. This was originally announced earlier in the year but subsequently delayed by lack of production capacity, is now in production. It is moulded in white polystyrene and has double-sliding mirror-glass doors

Butyl Symposium at NCRT

'COMPOUNDING OF BUTYL REVOLUTIONIZED OVER PAST FEW YEARS'

OPENING a two-day symposium on butyl rubber at the National College of Rubber Technology, B. L. Davies referred to the growth of production from the first commercial quantities in 1942 to today's 100,000 tons per year. Until 1958 only three plants, all in North America, were operating, but a new French plant is now on stream and a 30,000 ton unit is projected for the UK. Butyl production was now of the same order of magnitude as that of neoprene.

The 'spaghetti' extruder, one of various models used in butyl finishing — and easily the most spectacular— forces out simultaneously scores of strands of rubber

Originally envisaged as a general purpose rubber, butyl was first used in bulk for inner tubes but much development work had been carried out with a view to utilizing those properties which were of interest to others besides tyre manufacturers. This effort had been intensified recently and Mr Davies indicated the purpose of the symposium was to examine the results of this work with a view to the improvement of the products of the rubber industry.

Fundamentals

R. L. Zapp (Esso Research Ltd.) first reviewed the relation between structure and properties of butyl polymers by referring to the influence of molecular weight, distribution of chain length, degree of unsaturation and molecular structure. Diagrams illustrated how molecular weight distribution could control processing properties and how neighbouring methyl groups attached to the carbon backbone interfered with one another when the rubber was stretched and thus controlled dynamic properties. The temperature sensitivity was also associated with these side chains, and was greater than that of natural rubber; many properties were thereby influenced. The low permeability to gas was also explained on the basis of smaller molecular holes.

The low unsaturation of butyl rubber meant that the molecular weight between double bonds was high, and this made the polymer, rather than the sulphur, the limiting factor in vulcanization. Thus, increasing sulphur dosage merely increased the rate of attainment of maximum cross-linking rather than increasing the total possible number of links. Ozone attack was a function of unsaturation and state of cure.

Although this most non-polar of all synthetic rubbers had the least resistance to swelling by hydrocarbons, Mr Zapp said it had remarkable resistance to phosphate and other esters. In this respect it was superior to natural and styrene rubbers.

J. Walker (Polymer UK Ltd.) pointed out that butyl has always been regarded as a slow curing rubber and that this characteristic cannot readily be changed by merely adding more isoprene to the reaction mixture. Isoprene acted as a poison and even a 1% increase caused a 10% reduction in molecular weight of the polymer produced.

After trying the use of other dienes, without benefit, efforts were concentrated on further study of the reactions involved and on post-polymerization reactions. The first led to polymers having unsaturation as high as 3.3% and the second led to the production of halogenated polymers; both types were of considerable technical interest.

These newly developed grades, having higher unsaturation, while being almost as strong, showed higher modulus, improved set and increased resilience when properly compounded. The increased rate of cure was not accompanied by shorter scorch times when quinone type curing agents were employed. The higher unsaturation was found to give improved properties at sub-zero temperatures because of the retardation of rate of crystallization. The addition of plasticizers to a high viscosity grade was recommended.

Weathering and ageing in steam were improved and ozone resistance, though slightly less good, was still greatly superior to that of most other rubbers.

Curing Systems

Chlorobutyl rubber, said P. E. C. Davies (Esso Petroleum Co. Ltd.) had a faster curing rate due to more efficient cross-linking and increased reactivity, which provided opportunity for new types of curing system. These rubbers were compatible with most other elastomers and the combinations offered a wide range of end properties.

Curing systems consisting of TMTD and zinc oxide or of sulphur and tellurac or of quinone dioxime were all applicable and gave somewhat faster cures than with standard butyl rubber. Amine type curing agents such as diethylene triamine cured very rapidly and their scorch tendency as well as their speed could be controlled by addition of magnesium oxide. Resin cures, using methylol phenol resins, were also very rapid and could be controlled.

Amine and resin cures yielded products with outstanding ozone resistance, but best heat ageing was

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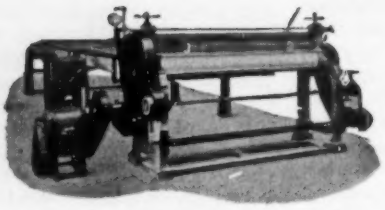

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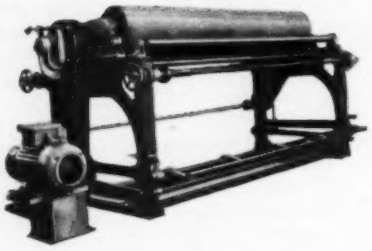

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obtained by the use of quinones, the products being far superior in these respects to natural, styrene or polychloroprene rubbers.

Blacks and hydrated silicas were found to be good reinforcing agents for chlorobutyl, giving products which showed special advantages in steam ageing tests. Several resinous tackifiers were quoted as processing aids. Such compounds showed good adhesion to tyre and belt carcases even after prolonged ageing and, being equal to standard butyl in permeability, were being used in tubeless tyre linings and conveyor belting.

Resin curing systems were compared with other systems by M. E. Blouin (Polymer UK Ltd.) who offered detailed data on four comparable compounds. The resin systems gave a moderate scorch time and a rapid cure, the good physical properties being well retained on extended curing and on ageing at temperatures up to 400°F. Stannous chloride was the preferred activator. The addition of five parts of neoprene or of SBR tended to counteract any tendency to soften and develop surface tackiness on ageing. The neoprene exerted an activating effect only in the presence of zinc oxide, this effect being more marked with less unsaturated polymers. When low unsaturation polymers were employed the concentration of resin and activator was increased for best results.

The excellent ageing in steam-air cycles had led to the employment of neoprene activated, resin cured butyl rubber in tyre curing bags and bladders which were claimed to be capable of withstanding 500-700 heats. In heat resistant conveyor belts, such rubbers were found to retain flexibility longer than other rubbers and in gaskets and similar articles outstanding service life had been achieved by this means. Resin cures could also be used with advantage in high voltage insulation, in articles required to resist corrosion by acids and alkalis and in translucent articles.

Heat Treatment

The well-known heat treatments applied to butyl rubbers were reviewed by A. G. Strong (Esso Petroleum Co. Ltd.) who indicated how Gessler's cycles of heating and resting had developed into the modern 'dynamic' mixing techniques in the internal mixer. The improved modulus and resistance to abrasion resulting from such treatments were widely known, but other properties such as electrical resistance were also improved. The development of 'promoters' led to the improvement of compounds having furnace blacks and silicas as reinforcing agents.

It had been established that the effects of heat treatment in the presence of channel black were associated with the presence of oxygen at the interface and that a system of links joining rubber to rubber and rubber to filler was introduced. Promoters were difunctional compounds acting through their nitroso groups but the mechanism of these changes was still unexplained.

Turning to the electrical properties of butyl rubbers and their application in the field of wire and cable insulation, Mr Strong emphasized the importance of heat treatment as a means of depressing tendency to develop porosity, to distort and to sag so that the conductor was no longer concentric.

Heat resistant butyl vulcanizates were specially suitable for low voltage cables which were thereby able to sustain higher temperatures. They were widely used in the tropics, in ships and in other locations where ambient temperatures were high. Higher operating temperature rendered possible reduction in conductor size.

Continuous vulcanization of butyl insulation was practised. High extrusion speed was possible and a set cure that quinone dioxime was superior to sulphur. If, however, the latter type was desired, low sulphur and high accelerator of the sulphur donor type were preferred. The fine reinforcing furnace blacks were the best fillers. Additions of neoprene to increase unsaturation and of polyisobutylene to improve extrusion were beneficial.

Ozone Resistance

Ozone resistance is also of great interest to cable makers and a useful survey was given by K. Pickard (Polymer UK Ltd.). He described his system of rating to evaluate experimental vulcanizates. This was based on the cube of the number of cracks of a given depth. He also used a 'rating index' which represented comparison with a control sample.

Butyl vulcanizates were shown to be far more resistant to ozone cracking than natural, styrene and polychloroprene rubbers. Best results were obtained when using a polymer of low unsaturation at a high state of cure produced in a short time, for example by the use of selenium or telluriam dithiocarbamate acceleration. Resin cures also gave good results and quinone systems were found to be best of all.

Antiozonants of the *p*-phenylene diamine type were effective only when

Photographs by Esso Petroleum

One of the operations in the manufacture of butyl rubber. The hot rollers of a milling machine, which an operator is inspecting, masticate the rubber and deliver it for a final cooling as a continuous strip of uniform thickness

occurred in the tube. After a silicone dip, cure was completed in the steam pan.

Heat degradation was attributed largely to the rupture of cross-links, so heat resistant compounds were best based on polymers of high unsaturation with an efficient curing system in order that the maximum number of cross-links were formed. Comparison of vulcanizing systems showed sufficient wax was added to produce blooming, thus carrying the soluble antiozonant to the surface, and only when static service ensured maintenance of an unbroken film.

The finer blacks were preferred in moderate loadings — not exceeding that at which a rapid fall of ozone resistance occurred. Fine non-black fillers gave adequate results but coarse fillers were detrimental.

Softeners reduced ozone resistance and should therefore be selected to give minimum reduction with maximum softening at a given concentration. Polythene or Hypalon addition was beneficial in raising the threshold strain, though substantial quantities were required.

Weathering

The surface tack which developed on outdoor exposure of butyl rubber vulcanizates was especially objectionable in light coloured articles because appearance was seriously marred by dirt accumulation. Further, this deposit was strongly adherent and could not be removed by simple means.

In 1959 it had been reported that certain metallic oxides, notably magnesium oxide, had beneficial effects but that the large amount required gave rise to surface crazing during weathering.

J. Walker described studies which confirmed this observation and extended the investigation to other aspects of compounding. It was found that UV absorbers were not effective and that mineral fillers when suitably employed could produce marked improvement. When clay was used, best results were given when magnesium oxide was also present in a polymer having high unsaturation. Oxides of zinc and calcium were quoted as second and third choice.

Although titanium oxide might be added to produce pale colour, its effect on surface tackiness was slight. When talc was the filler, no advantage was gained by the use of high unsaturation polymer; wax should be added and magnesium oxide omitted.

Moderate additions of neoprene were not beneficial but 10-20% of Hypalon produced effects similar in nature to those of magnesium oxide, except that the degree of improvement was less.

Applications

Turning to some specific applications of butyl rubbers, P. E. C. Davies referred to chemical plant linings, saying that when the rubber was suitably compounded, good splicing and adhesion to metal could be obtained. For chemical resistance and low permeability a low unsaturation polymer was preferred but when low temperature cures were necessary some compromise might be desirable. Heat treatment greatly improved resistance to strong oxidizing acids which normally caused tackiness. The addition of 15-25 parts of polythene was also beneficial.

A sulphur donor vulcanizing system was preferred with a semi-reinforcing black as main filler. Phenols and alkaline solutions generally were best handled in butyl linings cured with sulphur and a telluriam dithiocarbamate.

L. T. Butt (I.C.I. Ltd.), speaking as a user of butyl lined equipment, confirmed the superiority of butyl rubber for applications involving high concentrations of sulphuric acid and also for ducts carrying hot acid vapours. Compared with natural rubber and neoprene, the earlier large price difference had now been reduced to small proportions. To the user, he said, it was important that not only must the rubber be unattacked by the chemicals handled but also the chemicals must not be contaminated by matter extracted from the rubber. This was especially significant in plant handling organic substances.

Mr Butt also described the result of several years' experience with butyl covered conveyor belts in the chemical industry, confirming their superiority for handling fertilizers and other materials. Ply separation was satisfactory and repairs were made without difficulty, using a proprietary-isocyanate adhesive.

In dynamic conditions, the outstanding features of butyl rubber were high damping and low modulus. Using the conventional spring and dashpot analogy, Mr Zapp compared the behaviour of butyl with that of other rubbers and proceeded to show by means of vibration traces how the dynamic properties were effected by heat treatment and compounding variations. The effect of high temperature was to bring the dynamic properties of butyl nearer to those of natural rubber.

Applying these results to tyre problems, it was to be expected that butyl treads would provide increased riding comfort and less noise. Extensive testing on roads had amply confirmed the advantages especially on roads having surfaces similar to rough macadam, giving rise to medium frequency oscillations. Squeal during cornering had also been studied using special sound-insulated cars fitted with microphones on the hubs. Results demonstrated the advantages of a butyl tread and indicated that tread design was of major importance.

The coefficient of friction between butyl rubber and road surface was substantially greater than the corresponding figure for other rubbers. Thus greater road grip and shorter stopping distances were available even on wet roads. This rapid stopping, however, was accompanied by greater wear. Also on small cars the fuel consumption was increased by a few per cent. when butyl tyres are fitted. This difference was inappreciable on larger cars.

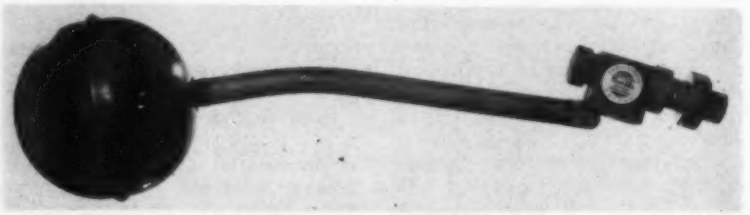
Discussing other aspects Mr Zapp expressed the view that the full advantages were gained only by building the whole tyre of butyl rubber and that the increased cost resulted, not from increased difficulty of building, but from the use of expensive compounding ingredients, reduced black loading, the use of Hypalon in side walls and similar factors.

It was of interest to note, incidentally, that tyre developments had led to the application of butyl rubber to certain other manufacturers. For example, the compound containing Hypalon, developed for white side walls, had been found eminently suitable for hospital sheeting.

In closing a vigorous discussion, the chairman said it was quite clear that the compounding of butyl rubber had been revolutionized during the past few years. The time appeared to be ripe for the application of these new techniques and improved compounds to the manufacture of many rubber products to provide better characteristics.

It was also plain that the advantages could be gained only by intelligent and knowledgable application of the principles which had been expounded.

Burtonwood Engineering Co. Ltd., of Warrington, have entered into an agreement with J. H. Vivian Co. Ltd. of Johannesburg for selling and distributing their oil seals in South Africa.



This ball valve is an addition to Barflo's range of all-plastic valves and provides an efficient means of regulating the flow of corrosive liquids. It is made from Kralastic ABS resin, PVC or high-impact PVC in a variety of sizes. Barflo, of Eastbourne, modify the design to suit particular applications

Plantation Share Survey

RUBBER plantation shares over the past few weeks have inclined to lower levels. An important influence was the estimates from the International Rubber Study Group which with sales from Government stockpiles indicate an adequate supply position for at least the next couple of months. The price of the commodity in Mincing Lane has also drifted lower. Until now there is little sign that the drift from natural to synthetic has been fully arrested.

The August statistics from the United States in fact show that the proportion of natural rubber in total new rubber consumption in that country fell further to under 30%. This compares with a quota of 31.8% in the first seven months of this year and with 34.1% over the whole of 1959. In August the Eastern material accounted for 37,300 tons from the combined usage of 125,400 tons. Totals for the first eight months of 1960 being 338,000 tons natural compared with 371,000 in the same period in the previous year and 731,600 tons synthetics against 703,800.

With regard to the new stereospecific synthetics recently referred to in the Study Group message reports from America indicate that a production capacity of at least 200,000 tons annually is likely to be built up by next year.

These rubbers are destined primarily for the heavy duty tyre market and the rapid build-up of capacity recently has been largely influenced by high prices for natural rubber and a possible shortage of the commodity in the next ten years.

Though world consumption of all kinds of rubbers is likely to jump from around 4,000,000 to 7,000,000 in the next decade production of natural rubber which at present provides more than half of total requirements is not expected to show any significant expansion. If the newcomers sell at 35 cents per lb. equal at the present exchange rate to 30d., this level, it is considered, will tend to become the ceiling for natural rubber prices.

The first nine months of the year has provided growers with an average selling price in London of approximately 2s. 10d. a lb. This is over 5d. a lb. better than the level for the corresponding period of 1959 and ensures a higher final rate for the current 12 months than the 2s. 6d. a lb. established a year ago. It is extremely unlikely in fact that fluctuations in the next three months will materially affect the overall prospect of improved selling prices and in many cases larger crops from companies ending their year on December 31.

Meantime mergers within the rubber plantation industry continue. CRAIGIELEA RUBBER is making exchange offers to shareholders in three other companies within the R. G. SHAW group—JOHORE RIVER, LAYANG RUBBER and MIDDLETON PLANTATIONS. If and when the proposed merger is carried through the resulting advantages will include improved marketability by reason of the substantial increase in the issued share capital of Craigielea. More effective use of the combined resources of the four companies will also be made. Given full acceptance issued capital of the company will be stepped up to £792,000 against £355,063 equal to £56 per acre on the group rubber areas of 14,156 acres.

Last year four of the companies in the JAMES WARREN group became fully owned subsidiaries of SEAFIELD AMALGAMATED RUBBER. Now five of the other companies in this well-known agency propose to merge. Terms have obviously been worked out with great care and with due regard to relative values of the respective properties and their resources and profit-earning capacities. It is clear as a result that the plan will bring benefits to those concerned in more efficient administration and as in the case of Craigielea an improved position in the marketing of the shares. This is an important point for the issued capital of some of the constituent companies is small and market facilities necessarily difficult.

A new company — WARREN RUBBER HOLDINGS — has been formed as the basis for the merger. Assuming full acceptance it will have an issued capital of £432,238 in 2s. shares, representing £56 per acre on 7,711 acres of rubber of which over 58% consists of modern high yielding material. The group output in the latest financial year amounted to 4,433,000lb. or over 750lb. per acre, while net liquid assets are regarded as adequate at about £115,000 or £15 per acre. Allowing for dividends which are to be paid in respect of the period to September 30, it appears that the market price of Warren Rubber Holdings 2s. shares should be in the region of 4s., representing a net market valuation of just under £100 per acre of rubber.

After a six-year break ANGLO-INDONESIAN PLANTATIONS is resuming dividends. The payment of 2½% declared was really no more than a token distribution. Nevertheless, it provides a useful return on the stock units quoted at less than a quarter of the nominal value. The sterling trading balance for 1959 was helped by a remittance in respect of interest on the company's Notes which have now been redeemed and for sterling expenditure on behalf of staff members and is fully absorbed by the dividend. The fact that the board of directors has now seen fit to pay out the year's balance in spite of the relatively meagre liquid assets held in this country, may be taken as a sign of faith. In fact, there is news that non-Dutch foreign firms with interest in Indonesia have been permitted to submit applications for remittances from local profits earned in 1957 and 1958.

PRANG BESAR RUBBER, one of the member companies of the HARRISON AND CROSFIELD group, holds a unique position in the plantation industry in that it combines the normal business of rubber production with research work for the development of improved planting material. And it is noteworthy that the company has achieved considerable success in both fields. Last year through the purchase of two estates and the sale of another the development of a single and larger intergrated unit was realized. Further considerable crop expansion can now be expected. On the other side the sale of planting material reached a record level, but adverse climatic conditions have seriously reduced the output of seeds in the present season.

Rubber output last year reached 3,212,000lb. compared with 2,611,000 lb. in the previous year. Sales of planting stock provided a profit of £35,400 in place of £20,300. Tax takes £89,000 from the 1959-60 profit of £211,500 leaving a distributable balance of £122,500 from which the 50% dividend takes £61,200. Replanting expenditure amounted to £18,900. In spite of the cost of new estate acquisitions, the accounts still reveal an outstandingly strong financial position.

F and H to Market Nonwoven Fabrics

Fothergill and Harvey Ltd., and Lantor Ltd. (an Association of Tootal Ltd., and West Point Manufacturing Company of the USA) have concluded an arrangement whereby Fothergill and Harvey Ltd. will sell Lantor nonwoven products for various industrial uses.

Among these uses, in the field of reinforced plastics, are both high and low pressure laminates. Nonwoven fabrics are said to offer definite economic advantages over woven fabrics in this field, together with technical advantages which include a high level of fatigue resistance, impact strength and machinability. Main applications for nonwoven fabrics in the field of high pressure laminates are for use in sheet form and for gear shapes. In the field of low pressure laminates nonwoven fabrics have wide applications as surfacing tissues for polyester/resin/glass laminates for various uses in chemical plant or for factory windows. Nonwovens can also be used in the field of filtration for both air and liquid uses.

NATURAL
AND SYNTHETIC
LATEX COMPOUNDS

PRE-VULCANISED
LATEX

RECLAIM DISPERSIONS

COLOUR DISPERSIONS

VULCANISING DISPERSIONS

RL

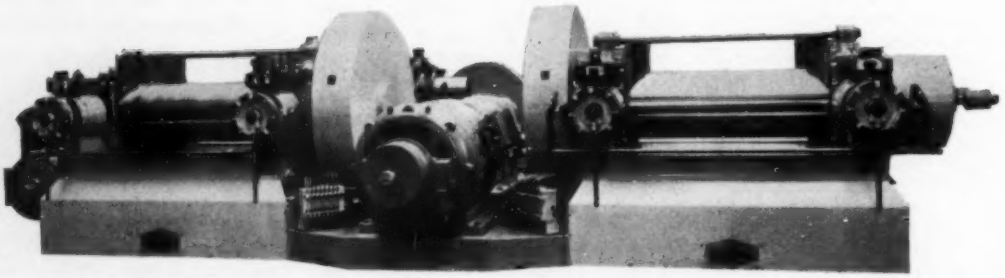
RUBBER LATEX LIMITED

Harling Road, Wythenshawe, Manchester.

Telephone: Wythenshawe 3226/7/8. Telegrams: Compounds, Manchester.

London Office: St. Dunstan's House, Idol Lane, London E.C.3. Telephone Mansion House 1005.

RLS3



A new Standard Design 22" x 60" Twin Mill arrangement on a Cast Iron Combination Vibro Mounted Bedplate with 200 H.P. Central Drive having a Spiral Bevel Helical Reduction Unit and Motor with Plug Braking Reversing Contactor Control and Lunn Type Low Position Safety equipment.

ESTABLISHED 1842

Joseph Robinson
and Co. Ltd.

SPRINGFIELD LANE, SALFORD 3,
LANCS., ENGLAND

Telephone: BLA 1866-7. Telegrams: OPAL M/C

Special Mill design to include customers' particular specification ably dealt with by proficient and fully experienced personnel.

Rubber Markets

LONDON

A small advance reflecting the East was short lived. Values gave way in sympathy with cheaper offers at Singapore. The sharp advance in the gold price caused some uncertainty, but further easiness ensued. The lower levels attracted moderate interest in forward landed positions, but factory interest was still only patchy.

Latest prices are as follows:

No. 1 RSS Spot: 27⅛d.-27⅜d.

Settlement House:

November 27⅛d.-27⅜d.
December 27⅛d.-27⅛d.
January/March 27⅛d.-27⅜d.
April/June 26⅞d.-27⅛d.
July/September 26⅝d.-26⅞d.
October/December unquoted.

No. 1 RSS cif basis ports:

November 27⅛d.-27⅜d.
December 27⅛d.-27⅛d.

Godown:

November 91⅝ Straits cents nominal.

LATEX

Centrifuged 60% latex per gallon in drums, seller, November, 15s. 8d., cif European ports. Spot, seller, 16s. 3d. Bulk, d.w. 15s. 4d. nominal. Creamed, seller, 15s. 3d. nominal, November. Normal, seller, November, 13s. 6d.

BANGKOK

No. 1 RSS

The price of No. 1 RSS at Bangkok on October 24 was 30.62½ (31.00) US cents per lb.

DJAKARTA

The market remained quietly steady on October 24. Prices were unchanged from levels on the previous day's trading.

	Rupiahs per kilo	
	Oct. 24	Previous
Spot No. 1 Priok ..	30.50b	30.50b
Spot No. 2 Priok ..	28.50b	28.50b
Spot No. 3 Priok ..	27.00b	27.00b
No. 1 fine pale crepe, spot	31.00b	31.00b

Tone: Quiet and steady.

CEYLON

No. 1 RSS

The price of No. 1 RSS at Colombo on October 24 was 103 (105) Ceylon cents per lb.

SINGAPORE

Dull conditions prevailed throughout the morning of October 24. Quotations were nominal for most of the session. Operators were disinclined to enter into new commitments without some sign of a trend developing. Lower sheets were neglected. Sellers offered rather more freely than of late. In the afternoon, the market was quietly steady.

	Malayan cents per lb., fob Malayan ports to open ports	
	October 24	Previous Close
No. 1 RSS, Nov. ..	94⅛–94⅜	94⅞–95
Dec. ..	94⅞–95⅛	95⅛–95⅛
No. 2 RSS, Nov. ..	93⅛–94	94⅛–94⅜
No. 3 RSS, Nov. ..	92⅛–93⅛	93⅛–94
No. 4 RSS, Nov. ..	89 –90	89⅛–90⅛
No. 5 RSS, Nov. ..	84 –85	84⅛–85⅛
No. 1 RSS Spot ..	93⅛–94	94⅛–94⅜
No. 3 blanket, thick remilled crepe, Nov.	79 –80	79⅛–80⅛
No. 1 fine pale crepe, Nov. ..	98⅛–99⅛	99 –100
2X thin brown crepe, Nov. ..	77 –78	77⅛–78⅛

Tone: Quietly steady.

The Industries Syndicate quote latex, native produce, 60% centrifugal, packed in rectangular drums, fob at 182.00d. per gallon.

NEW YORK

The New York rubber market ruled as under on October 24:

DEALERS' PRICES

	US cents per lb. Ex-dock	
	Oct. 24	Previous
No. 1 RSS, Nov. ..	33⅛a	33⅛b–33⅛a
Dec. ..	32⅞a	33a
No. 2 RSS, Nov. ..	33⅛a	33⅛b–33⅛a
Dec. ..	32⅞a	32⅞a
No. 3 RSS, Nov. ..	33a	33b–33⅛a
Dec. ..	32⅛a	32⅛a
No. 1 RSS Spot ..	33⅞n	34⅛n
No. 3 amber blanket crepe, Jan.	..28b–28⅛a	28b–28⅛a

FUTURES—REX CONTRACT

	October 24	Prev. Close
Nov. ..	33.45b–33.50a	33.85b–33.95a
Jan. ..	32.40b–32.50a	32.75t
March ..	32.00b–32.10a	32.30b–32.40a
May ..	31.75t	32.10t
July ..	31.50b–31.70a	31.80b–32.00a
Sept. ..	31.30b–31.50a	31.55b–31.85a
Nov. ..	31.10b–31.30a	31 50n

Sales: 54. Tone: B'steady.

Futures were easier on October 24 on scattered selling in light dealings. Traders said the decline abroad influenced some selling. Quietness in physical rubber and easiness in the stock market were also contributing factors in the selling. In late trading futures were barely steady.

AMSTERDAM

The Amsterdam rubber market ruled as under on October 24:

	Guilders per kilo	
No. 1 RMA:	Oct. 24	Previous
October ..	2.72	2.72
November ..	2.71	2.71
December ..	2.70	2.70
Oct./Dec. ..	2.71	2.71
January	2.69	2.67
February ..	2.68	2.66

Sales: Nil. Tendency: Quiet.

COMPANIES in the NEWS

Dunlop Group

Dunlop have issued trading results of the group for the first six months of 1960. Sales to customers were £136m. (£127m. in the same period of 1959); net balance from trading (before depreciation, interest and taxation) was £11.18m. (£10.52m.); net profit (before tax) £6.75m. (£6.34m.); net profit (after tax) £3.29m. (£3.15m.).

The Group results for the first six months of the current year show an increase compared with the corresponding period of 1959 in spite of less profitable trading in certain overseas countries. Since June turnover has been maintained but, the company comments, margins are being influenced by the higher cost of natural rubber used in recent production and by wage increases.

For the rest of the year, it adds, business will be affected by the reduced activity in the motor industry in the United Kingdom and elsewhere. Profits for July/December are unlikely to reach those of the second half of 1959 (£4.02m.) but on present estimates should be about the level achieved during January/June 1960.

The interim dividend should be at the same rate as in the previous year, 4d. per 10s. stock unit less income tax. This will be paid on November 30 1960.

Laporte

Laporte Industries Ltd. are paying on December 1 an interim dividend on ordinary shares of 3% for the year ending March 31 1961.

The interim dividend paid in December 1959 was at the rate of 3% on the issued capital of £8,757,600. The present dividend is payable on the issued capital of £11,822,760 due to the increases in the ordinary capital which have taken place during the current year.

Polyorc-Alkathene

Yorkshire Imperial Metals Ltd. and Imperial Chemical Industries Ltd. have decided to combine their activities in the marketing of polythene tube. Yorkshire Imperial Metals have had sole responsibility for marketing 'Alkathene' tube since October 3 1960. The combined product of the two companies is known as 'Polyorc-Alkathene.'

'Polyorc-Alkathene' is one of the few polythene tubes licensed by the BSI to bear the kite mark.

Nigerian Rubber

The price of rubber for November has been fixed at 28.9716d. per lb., for the purpose of assessing export duty. This compares with 29.01d. in October.

Industry INTELLIGENCE

Machines, Materials and Equipment

Safety Device for Cranes

Serious accidents are sometimes caused by the jibs of cranes or similar plant coming into contact with overhead power lines. A simple warning system has been developed by Thos. W. Ward Ltd., Albion Works, P.O. Box 141, Sheffield, to give warning of the approach of such equipment to power lines. A detector probe attached to the boom head of the crane picks up an induced AC voltage (or a ripple voltage from DC lines) which is fed to equipment in the driver's cabin.

The cabin equipment consists of a master control box, with an easily adjusted sensitivity control, and a warning horn which sounds a tone which increases in volume as the boom comes nearer to the power line. The equipment is capable of responding at a distance of 400ft.; the actual danger distance is pre-set by the operator on his sensitivity control.

Fluid Economizer

A simple unit has been marketed to facilitate and economize the application of small quantities of liquid by brush. It should be useful for such purposes as lubrication in drilling or tapping.

A container holding a pint of liquid feeds it through a filter to a trough containing two brushes. The feed is only sufficient to saturate the bristles of the brushes and with each withdrawal of a brush, the trough is automatically replenished.

The filter can be removed for cleaning without disturbing the liquid level in the trough. The equipment is manufactured in alternative materials which cover the use of a wide variety of oils and corrosive liquids; manufacturers are Matchless Machines Ltd., 18 Bolton Street, Piccadilly, London, W.1.

Washer for Glassware

A difficulty in washing glassware for laboratory and similar purposes, particularly in hard water areas, is the prevention of deposits left on the glass as the water evaporates. This usually involves drying the glass by some medium which will not itself introduce contamination.

One remedy is to use de-ionized water, but the quantity required for thorough washing makes this an uneconomic process.

A similar problem, raising far more stringent requirements, arises in the manufacture of transistors and other semi-conductor devices. An investigation of this requirement has led to the development of a 'transistor washer,' by Elga Products Ltd., Lane End, Bucks., in which pure water is prepared by a mixed bed deionization, and recirculated in a closed cycle to effect economy. An equipment based on this development is now available for laboratory glass-washing.

New Guillotine Press

Developed from the 5in. model in the well-known range of 'Autogil' automatic roll feed guillotines, made by Wallis Engineering Co., 399 Warwick Road, Birmingham, 11, the new

No. 5 press will produce pressings at the rate of 120 pieces per minute or will automatically measure and cut pieces from strip or coiled material to any length up to one mile. The end of each piece can be cut and shaped or cut and punched simultaneously.

Simple holes of up to ¾in. diameter or profiles can be punched and pierced in approximately 1/64in. mild steel or in non-metallic materials up to ¼in. thick. Plastics, rubber, leather, cardboard, in fact laminations of every kind can be cleanly cut and accurately fed.

The press is obtainable in Type PS or PL, and in Type PEL which can be arranged to cut and punch up to 6,000ft. lengths. Type PS machines punch and cut pieces to length — any dimensions — up to 8in. maximum, 120 strokes per minute. Type PL machines punch and cut pieces to length — any dimensions — up to 96in. maximum (according to cam, from 10 to 60 strokes per minute). All type PL and PEL machines can be instantly locked to operate once each revolution 0in.–8in. 120 strokes per minute. Weight: 100lb. (220kg.). Measurements, overall: 21in. high; 15¼in. wide; 14in. deep (53.3cm.; 39.4cm.; 35.5cm.).

Publications

Dunlop Fan Belts

Full details of the wide range of Dunlop fan belts for cars and commercial vehicles are given in easy-to-read form in a new 48-page catalogue published by the company.

The catalogue is the most comprehensive yet issued by Dunlop and includes recommendations for all British, American and Continental popular cars and trucks. A separate section deals with tractors and there is an extremely useful interchange list of Dunlop and other manufacturers' belts. An insert sheet lists the prices, effective since September 19, of Dunlop fan belts. Copies of the catalogue can be obtained from Dunlop depots.

Corrosion Report

The Annual Report for 1959 of the European Federation of Corrosion is now available (duplicated typescript, 143 pages, size DIN A4). It has been edited, as in previous years, by the Frankfurt Office of the General Secretariat of the European Federation of Corrosion.

The report is divided into three parts which serve the following purposes. The first part presents the report of the General Secretariat and gives an account of activities within the Federation; the second part contains reports from member societies on their technical work in the field of corrosion and the third gives a survey of the institutes and research centres in individual countries which are concerned with problems of corrosion and the protection of materials of construction.

The report can be ordered from the General Secretariat of the European Federation of Corrosion, Büro Frankfurt (Main), Postfach 7746. The price to members of societies affiliated to the Federation is DM 15 (give the name of the society when ordering) and to non-members DM 30, including forwarding charges.

Viscosity-Temperature Recorder for Mooney Viscometers

Two types of electronic strip chart recorders designed for use with Scott Model NBS and Model STI Mooney Shearing Disc Viscometers, are described in a bulletin published by Scott Testers Inc. The bulletin includes details and illustrations of Scott's standard single-pen type recorder for direct readings of viscosity in Mooney Units, and a newly added two-pen type recorder which provides simultaneously on the same strip chart (1) a direct reading of viscosity in Mooney Units, and (2) a record of the actual temperature within the test specimen itself.

Material Prices

Prices of materials appear regularly in RUBBER JOURNAL AND INTERNATIONAL PLASTICS on the last Saturday of each month. It will be appreciated if suppliers will give notification of any price changes and additions to or deletions from their range. Comments on the present materials and classifications are invited in order that the list may be made of maximum service to our readers.

Unless otherwise stated prices are per lb. In most cases prices vary according to quantity. pc—per cwt pg—per gallon pt—per ton ag—according to grade xs—ex-store xw—ex-wharf dp—duty paid sp—special prices for contracts del—delivered cp—carriage paid

Accelerators

Alpha	5s. 8d.—6s. 4d.
Ancap	3s. 8d.
Ancap Zinc salt cp	2s. 10½d.
Ancatax cp	4s.
Ancazate ME cp	6s. 10d.
Ancazate Q del	6s. 4d.
Ancazate ZZ del	5s. 3d.
Ancazide ME cp	6s. 2d.
Cu.D.D.	9s. 3d.—10s.
D.Bu.D.	10s. 6d.—11s. 3d.
D.D.D.	12s. 2d.—13s. 3d.
D.P.G. cp	3s. 8d.
D.O.T.G. cp	3s. 8d.
Dibenzo GMF	27s.—28s. 6d.
Furbac cp	5s. 3d.
Gamma	10s. 6d.—11s. 3d.
GMF	27s.—28s. 6d.
L.M.D.	9s. 3d.—10s.
M.Z.1	3s. 6d.—4s. 2d.
N.Bu.D.	10s. 6d.—11s. 3d.
Ni.P.D.	12s. 2d.—13s. 3d.
P.P.D.	12s. 2d.—13s. 3d.
P.T.D.	12s. 2d.—13s. 3d.
Robac 22	10s.—11s. 3d.
Robac 44	9s. 1d.—9s. 10d.
S.P.D.	9s. 3d.—10s.
Suparac M	9s. 7d.
T.B.U.T.	15s.—16s.
T.E.T.	6s. 6d.—7s. 4d.
Thiuram P.25	15s.—16s.
T.M.S.	7s. 8d.—8s. 6d.
T.M.T.	5s. 4d.—6s. 3d.
Vulcacit CZ deldp	7s. 1d.
Vulcacit F deldp	4s. 8½d.
Vulcacit NP deldp	11s. 2d.
Vulcacit P Extra N deldp	8s. 1d.
Z.B.E.D.	15s.—16s.
Z.Bu.D.	6s. 3d.—7s. 3d.
Z.D.C.	5s. 1d.—5s. 7d.
Z.L.	9s. 3d.—10s.
Z.P.D.	9s. 3d.—10s.

Antioxidants and Antiozonants

Agerite HPX cp	4s. 8d.
Antioxidant 2246 del	12s. 4d.
Antioxidant SP del	4s. 6d.
BLE-25	3s. 7d.—4s. 5d.
BXA	3s. 6½d.—4s. 5½d.
Naugawhite	4s. 9d.—5s. 6d.
Octamine	3s. 9d.—4s. 6d.
Polygard	3s. 7½d.—4s. 5d.
UOP 88 xs	9s. 3d.
UOP 288 xs	9s. 3d.
Wing-Stay S	3s. 8d.—4s.
Wing-Stay T	4s. 10d.—5s. 6d.
Wing-Stay 100	10s. 6d.—11s. 6d.

Compounding Ingredients

Barytes ptag	£10—£40
Calcium Silicate del	9d.—10½d.
Calcene ptxw	£52—£69 10s.
Carbonate, Light Mg. ptsp	£97
Carbonate, Actidated Ca. pt	£28—£30
Carbon Blacks:	
Conductex SCF	1s. 2½d.
Continental AMPC ag	11½d.—1s. 4½d.
Continex FEF ag	9½d.—10½d.
Continex HAF ag	10½d.—11d.
Continex HMF ag	9½d.—9½d.
Continex ISAF ag	1s. 0½d.—1s. 0½d.
Continex SRF, SRF-NS ag	8½d.—9d.
Dixie 45 GPF	6½d.—7½d.
Dixie 60 HAF	7½d.—8½d.
Dixie 70 ISAF	9½d.—10½d.
Furnex SRF	9d.
Kosmos 45 GPF	6½d.—7d.
Kosmos 60 HAF	7½d.—8d.
Magecol 888 SRF	7.60d.
Micronex MPC	11½d.
Micronex W6 EPC	11½d.
Philblack A. FEF	7d.—8d.
Philblack E. SAF	1s. 0½d.—1s. 1d.
Philblack G. GPF	6½d.—7½d.
Philblack I. ISAF	9½d.—10½d.
Philblack O HAF	7½d.—8½d.
Regal 300	7½d.—8d.
Regal 600	9½d.—10d.
Statex B. FF	10½d.
Statex R. HAF	11d.
Statex 93 HMF	9½d.
Sterling SO FEF	7d.—7½d.
Sterling V. GPF	6½d.—7d.
Ukarb 327 GPF xs	6½d.—7½d.
Ukarb 340 xs	7½d.—8½d.
Vulcan 6 ISAF	9½d.—10d.
Vulcan C CF	11d.—11½d.
Vulcan 3 HAF	7½d.—8d.
Vulcan XXX SCF	1s. 2½d.—1s. 2½d.
China Clay ptagxs	£12—£68 10s.
Factice Dark	1s. 0½d.
Factice Light	1s. 7d.
Kieselguhr Spanish White ptxs	£37 12s. 6d.
Lithopone 30% ptxs	£68 10s.
Manosil VN3 pt	£120 5s.—£150 5s.
Micafine Powdered Mica ptxs	£67 10s.
Ochre Yellow pcxs	£1 19s.
Oxide Light Mg ptsp	£245
Oxide Red pcxs	£4 3s.
Oxide Titanium 98% pcxs	£8 8s.
Rutiox CR pcxs	£9 3s.
Rubber Gen. Gran. Mineral ptxs	£35 5s.
Shellac Dewaxed xs	1s. 9d.—2s. 3d.
Shellac Orange xs	2s.—3s. 9d.
Silica Hydrated ptxs	£113
Sulphur Manox Insoluble del	1s. 9d.
Sulphur Powdered ptdel	£20 17s.
Sulphur Sublimed Flowers ptxs	£52 10s.
Talc Italian ptxs	£28 2s. 6d.
Tufknit Durham CS	8½d.—10½d.
White Lead Dry ptdel sp	£115 5s.
Whitetex 2 Clay ptxs	£40 10s.
Whiting ptxs	£5 9s. 6d.—£7 7s. 6d.
Zinc Oxide pcdel	£6

Plasticizers and Softeners

Abalyn pc	220s.—271s.
Al Stearate ptxwdp	£253 10s.
Bisoflex 102 pt	£513—£568
Butyl Ricinoleate	2s. 6d.—2s. 6½d.
But. Ac Ricinoleate	3s. 0½d.—3s. 1½d.
Butyl Stearate pt	£277—£282
Ca. Stearate ptcp	£220
Diallyl Phthalate	3s. 11d.—4s. 11½d.
Dialkyl Phthalate pt	£221—£222
Dibutyl Phthalate pt	£203—£204
Dibutyl Sebacate	5s. 9½d.
DiOA pt	£354—£357
DiOS sp	5s. 0½d.—5s. 2d.
DOA pt	£414—£420
DOP pt	£276—£277
DOS sp	5s. 7½d.—5s. 9d.
Disobutyl Phthalate pt	£196—£197
Diisooctyl Phthalate pt	£221—£222
Dinonyl Phthalate pt	£211—£212
DNS sp	5s. 2½d.—5s. 4½d.
Ester Gum pcag	130s.—150s.
Flexol 3GO	4s. 8d.
Hercolyn pc	242s.—294s.
Lankroflex ED3	3s. 2d.—3s. 2½d.
Lankroflex 29 pt	£216—£217
Lead Stearate ptxwdp	£223 10s.
Methyl Ricinoleate	2s. 4d.—2s. 4½d.
Me. Ac Ricinoleate	2s. 11½d.—3s. 0½d.
Polyglycol Oleate 400 pt	£285
Reomol D79A pt	£354—£357
Reomol D79S sp	5s. 0½d.—5s. 2d.
Reoplex 100 sp	6s. 1½d.—6s. 2½d.
Reoplex 110 sp	5s. 10d.—6s. 5½d.
Reoplex 220 sp	5s. 6½d.—5s. 8d.
Reoplex 300 sp	7s. 2d.—7s. 3½d.
Reoplex 400 sp	4s. 2½d.—4s. 4d.
Rosin Oil pgag	8s.—18s.
Triphenyl Phosphate pt	£366
Tric esyl Phosphate pt	£233
Trixylyl Phosphate pt	£200
Zinc Stearate ptdel	£220—£230

Solvents and General Chemicals

Acetic acid ptdel	£97—£106
Acetic Anhydride ptdel	£128
Acetone ptdel	£75—£120
Alcohol:	
Absolute 74.5 op pgdel	4s. 0½d.—4s. 4½d.
Butyl pt	£132—£193 10s.
sec-Butyl ptdel	£128—£168
Ter-Butyl ptdel	£172—£195
Isopropyl Tech. 99% pgdel	5s.—6s. 5½d.
Butyl ' Carbitol ' pt	£283
Butyl Acetate pt	£159—£217
Caprylic Acid ptdel	£395
Carbon Bisulphide ptxs	£71 10s.
Carbon Tetrachloride pg	12s. 4d.—20s.
' Cellosolve ' Acetate pt	£250
Cresol m- 98% del	4s. 9d.
Cresol o- 30/31°C. del	1s.
Cresol p- 34/35°C. del	5s.
Ethyl Acetate pt	£131—£189
Formaldehyde ptdel	£40
Glycol:	
Diethylene pt	£158
Ethylene pt	£132
Polyethylene 200 pt	£214
" 300 pt	£214
" 400 pt	£214
" 1,500 pt	£264
" 4,000 pt	£274
" 6,000 pt	£294
Isopropyl Acetate pt	£126—£184
Isobutyl Acetate 80% pt	£126—£185
Lauric Acid ptdel	£273
M.E.K. ptdel	£134 10s.—£143 10s.
M.I.B.K. ptdel	£166—£209
Methylated Spirits pgdel:	
Industrial 61op	5s. 5½d.—7s. 2d.
" 74 op	6s. 3d.—7s. 11½d.
' Q ' grade 68 op	8s. 5½d.—10s. 5d.
Pyridinised 66 op	5s. 10d.—7s. 6½d.
Denatured Methanol	3s. 9½d.—4s. 10d.
Monoethanolamine pt	£252
Naphtha Coal tar pg:	
Heavy 90—190	4s.
Light 90—160	5s. 1d.
Palmitic Acid ptdel	£147
Phenol pldel	1s. 4d.—1s. 7d.
Pyridine pg	16s. 6d.
Stearine ptag	£108—£130
Toluol Pure/Nitration pg	5s. 8d.
Toluol 90's pg	5s.
Triethanolamine pt	£224
Xylol 2/30 pg	5s. 9d.

Canadian Asbestos

Shipments of asbestos from Canadian mines in August rose to 103,286 tons from 92,529 in the preceding month and 91,929 in the corresponding month last year. This brought January-August shipments to 703,437 tons, larger by 6.8% than the preceding year's corresponding total of 658,924 tons.

Mr D. A. Ogilvie, a drawing office manager with the parent company, Baker Perkins, has been appointed a director of Baker Perkins (Exports).

Patent Specifications

The following information is prepared from published Patent Specifications by permission of the Controller of H.M. Stationery Office. The full Specifications can be obtained from the Patent Office, 25 Southampton Buildings, W.C.2, at 3s. 6d. per copy (including postage).

Polymerization of Dienes

No. 847,456. N. V. de Bataafsche Petroleum Mij. Application and Filed, March 31 1959. Application in USA, March 31 1958. Published, September 7 1960.

Conjugated dienes are polymerized by exposing an aqueous emulsion of the monomer to between 10^5 and 10^8 rads of high energy radiation at a temperature between −40°C. and 150°C. in an inert atmosphere while agitation of the emulsion is maintained. The production of rubbery polymers by polymerizing butadiene, isoprene and piperylene is described in examples. Other monomers which may be polymerized by the process include dimethyl butadiene, methyl pentadiene and chloroprene.

Bonding Polythene

No. 846,218. Phillips Petroleum Company. Application and Filed, August 25 1958. Application in USA, September 30 1957. Published, August 31 1960.

A method for bonding polythene to articles of natural or synthetic rubber, a layer of hydrogenated polybutadiene being interposed as a bonding medium, the unsaturation of this being not more than 50% of the unsaturation of the polybutadiene before hydrogenation. The bond is formed by heat and pressure. A two-ply laminate of hydrogenated polybutadiene and polythene is first produced by calendering, and this is then applied to the rubber article to complete the operation.

Shorter Abstracts

Elastic Webbing. 845,754. Dunlop Rubber Co. Ltd. Filed, March 7 1958.—Fabric with elastomeric material bonded thereto, such as is used for supporting upholstery.

Injection Moulding. 845,435. Raymonde Mille. Filed, November 23 1956.—Construction of cylinder and piston of an injection moulding machine designed to avoid lamination.

Packaging Exhibition

The Fresh Food Packaging Exhibition at Alexandra Palace from November 1-4, will be formally opened by J. P. Van den Bergh, president of the food manufacturers' federation.

Exhibitors will include Anglo-American Plastics, British Sidac, British Visqueen, Cascelloid, Commercial Plastics, Lustroid, Metal Box, Microcell, and Polymesh.

Mr Harold A. White has been appointed to the newly created position of assistant managing director of Hercules Powder Company of London.

New British Standard

Tubular Heat Exchangers

This much-needed British Standard for tubular heat exchangers for general purposes (BS 3274:1960) specifies minimum requirements and gives guidance for the mechanical design and construction of shell-and-tube heat exchangers, a specialized form of pressure vessel widely used in industry for such purposes as heating, cooling, evaporating and chemical reaction.

Information supplied by the Tubular Heat Exchanger Manufacturer's Association (TEMA) and the American Society of Mechanical Engineers has been used in the preparation of the standard and the recommendations of BS 2041 (tubular heat exchangers for use in the petroleum industry) have been taken into account wherever applicable.

The standard covers cylindrical shell and plain tube heat exchangers for general applications within size ranges of 6in. to 42in. for nominal shell diameters, of 6ft. to 16ft. for tube lengths and of ¾in. to 1¼in. for tube diameters. The following types of heat exchanger are included: fixed tube plate (non-removable tube bundle), U-tube (removable tube bundle) and floating head (removable tube bundle).

Because a wide range of heat exchangers exists, more sizes have been listed than desirable in a standard. Industry is asked to encourage the use of certain sizes as being preferred so that eventually it should be possible to cut out the other sizes.

Copies of this standard may be obtained from the British Standards Institution, Sales Branch, 2 Park Street, London, W.1, price 20s.

Glass Rove Price Down

Turner Brothers Asbestos Co. Ltd., Rochdale, have reduced the price of their 'Duraglas' 'A' Glass — High Alkali Rove, as from October 6. Reductions range from 2d. per lb. down for 60 end rove on quantities under 100lb., to a 6d. per lb. reduction on a 30 end rove for quantities over 10,000lb.

Rubber Statistics

Due to pressure on space this regular feature has had to be held over. It will appear next week.

TRADE MARKS

Objections to the registration of any of the undermentioned applications may be lodged with the Comptroller-General of Patents, Designs and Trade Marks at the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, within one month of the date mentioned. The objections must be stated on Trade Marks Form No. 7, cost £2, obtainable through any money order office. The extracts—from 'The Trade Marks Journal'—given below are reproduced by permission of the Controller of H.M. Stationery Office.

CEDLINE (793,149) Marking materials for roads, made principally of synthetic resins. Civil Engineering Developments (Thurrock) Ltd., London Road, West Thurrock, Grays, Essex. (Class 1; October 5 1960.)

LYNKIT (B796,534) Synthetic resins; and extenders, chemical agents and catalysts, being chemical substances; all sold for use with glass fibre as a repairing kit for vehicle bodies, boats, domestic appliances and for the like goods made of glass fibre compounds or materials. Lynester Products Ltd., Nelson Lane, Warwick. (Class 1; October 5 1960.)

(805,397) Carbonates and silicates, all being chemical substances for use in the course of manufacture as fillers for rubber compounds, paints and latex, and for application to rubber and to rubber articles. Compounding Ingredients Ltd., Canada House, 3 Chepstow Street, Manchester, 1. (Class 1; October 5 1960.)

ORTHOFOAM (800,448) Padding materials made of foamed plastics. Jacob Cowen and Sons Ltd., Ellers Mill, Dalston, Carlisle. (Class 17; October 5 1960.)

HYPERFIL (B803,097) Resin-impregnated glass fibre fabrics for electric insulating purposes. Insulating Sleevings and Tapes Ltd., Electron Works, Brook Street, Preston, Lancashire. (Class 17; October 5 1960.)

HYPERLAM (B803,098) Laminated resin-impregnated glass fibre fabrics for electric insulating purposes. Insulating Sleevings and Tapes Ltd., Electron Works, Brook Street, Preston, Lancashire. (Class 17; October 5 1960.)

HYPERSEAL (B803,099) Electric insulating tapes made of resin-impregnated glass fibre and synthetic textile fibre fabrics. Insulating Sleevings and Tapes Ltd., Electron Works, Brook Street, Preston, Lancashire. (Class 17; October 5 1960.)

POLYSTANTOR (794,196) Hose pipes, pipe fittings and pipe couplings, all made of plastics. Yorkshire Imperial Metals Ltd., Haigh Park Road, Stourton, Leeds, Yorkshire. (Class 17; October 5 1960.)

WRAPMASTER (B799,090) Machines for the heat-sealing of sheets of thermoplastics. Tobenoil Ltd., 23 Bedford Row, London, W.C.1. (Class 17; October 5 1960.)

POLYSTANTOR (796,869) Pipes made of plastics for use in building and civil engineering constructions. Yorkshire Imperial Metals Ltd., Haigh Park Road, Stourton, Leeds, Yorkshire. (Class 18; October 5 1960.)

PLASMARC (802,525) All goods included in Class 19. Plastics Marketing Co. Ltd., Buckhurst Avenue, Sevenoaks, Kent. (Class 18; October 5 1960.)

FAIRIESTRIP (802,058) Decorative strip material made of plastics, for use on furniture and the like. Fletcher and Farlow Ltd., Finsbury Court, Finsbury Pavement, London, E.C.2. (Class 20; October 5 1960.)

Structural reinforced plastic ambulance moulded by Wadham Bros. (Coachbuilders) Ltd., Waterlooville, Hants. Material used was polyester resin and Deeglass chopped strand glass fibre mat supplied by Glass Yarns and Deeside Fabrics Ltd.

NEW COMPANIES

Noel Bibby Ltd. (670,593).—September 21. Capital: £2,000 in £1 shares. To carry on the business of manufacturers of and dealers in water and rain proof coats, aprons, collars, cuffs, canvas, clothing, etc. The directors are: Noel Bibby and Brenda R. Bibby, both of 5 Ridge Lane, Valley Road, Radcliffe-on-Trent. Regd. office: 24 Warser Gate, Nottingham.

Essex Moulders Ltd. (670,574).—September 21. Capital: £100 in £1 ordinary shares. To carry on the business of manufacturers of and dealers in plastic mouldings and plastic goods of all kinds, etc. The directors are: Terence C. Musk and Mrs Margaret Musk, both of 50 Huddart Street, E.3. Regd. office: 33 Victoria Avenue, Romford, Essex.

Caciquin Ltd. (670,721).—September 22. Capital: £100 in £1 shares. To carry on the business of manufacturers and processors of and dealers in plastics, modelling and moulding materials, substances and compositions, etc. The first directors are to be appointed by the subscribers. Regd. office: 6 Surrey Street, W.C.2.

Bruce Peter (Plastics) Ltd. (670,529).—September 21. Capital: £100 in £1 shares. To carry on the business of manufacturers engineers in plastics, etc. The directors are: Peter B. Sheepwash, 48 Purford Green, Harlow; John W. Young, 181 Parsonage Lane, Enfield; Christopher S. Wilkin; Anthony Pursall. Regd. office: 77 Strafford Gate, Potters Bar.

Sto-Chem Ltd. (671,196).—September 28. Capital: £200,000 in £1 shares. To manufacture and sell synthetic rubber latices, resin latices of butadiene and styrene, latices of butadiene and acrylonitrile and related polymer and copolymer latices and compounds, etc. The first directors are George R. Vila, Thomas A. Clayton, Kennedy M. Nahas, Robert I. Wishnick, William Wishnick, Douglas Roberts and Robert Shacklady, addresses not stated. Solicitors: Slaughter and May, 18 Austin Friars, E.C.2.

Plastic Developments (Leicester) Ltd. (671,319).—September 29. Capital: £1,000 in £1 shares. The directors are: Leslie W. Thirdborough, 'Whiteladies,' Willoughby, Waterless, Leics.; Jack P. Waring, 24 Holywell Road, Leicester. Regd. office: 8 Peacock Lane, Leicester.

Dowty Technical Developments Ltd. (671,258).—September 29. Capital: £10,000 in £1 shares. To carry on the business of designers, developers, manufacturers and contractors for and repairers of and dealers in equipment apparatus, plant and machinery, etc. Power is also taken to carry on business as manufacturers and producers of and dealers in all kinds of plastics and plastic materials, etc. The first directors are not named. Solicitors: Stephenson Harwood and Tatham, Saddlers Hall, Gutter Lane, E.C.2.

Jayrose Creations Ltd. (670,123).—September 15. Capital: £1,000 in £1 shares. To carry on the business of sales agents, manufacturers and mercantile agents, general merchants, manufacturers of and dealers in plastics and synthetic materials of all kinds, etc. Solicitors: Edwin A. Davis and Co., W.1.

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A VACANCY exists for a new junior staff appointment with an old established and progressive rubber hose manufacturer in Hertfordshire as a fitter engineer for supervising the assembling of low pressure and high pressure cotton and wire braided hose and other hose fitting work. Age between 30 and 40 years. Previous experience very necessary.—Apply Box 616. (616)

MSL *have been retained to advise on the appointment of a*

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The appointment carries responsibility to the Managing Director for the executive management of production from raw materials to despatch, together with planning and loading, and for the control of the flow of work through the mill.

Although it is desirable to obtain the services of a Manager with experience of P.V.C. coated fabrics, this will not debar those from allied trades who have the right background. Candidates must have extensive experience in mill management and be fully acquainted with modern procedures of loading and planning. Early training in the laboratory on research and technical process control would be strong recommendations. Technical qualifications in chemistry, plastics or fabric construction would also be helpful.

Age approximately 40 to 45. Remuneration will be approximately £2,500, and a car will be provided. Assistance with housing will be considered if necessary. Please send brief details in confidence quoting LU.3100 to M. B. Berks.

MANAGEMENT SELECTION LIMITED
17 Stratton Street, London, W.1

In no circumstances will a candidate's identity be disclosed to our client unless he gives permission after a confidential interview at which he will be given full details of the appointment.

(605)

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required by a rubber company in the Midlands to reorganise, develop and control an extruding department.

Candidates in age range 28 to 40 must have several years' similar experience and should have original ideas on layout and mechanisation.

Starting salary, dependant on qualifications and experience, in region of £1,000 per annum, excellent prospects, pension scheme and other conditions.

Send full details of education and experience to Box 608. (608)

A VACANCY occurs for a young rubber technologist of L.I.R.I. standard. Experience in footwear compounds would be an advantage. This is an opening with good prospects.—Applications, which will be treated with confidence, should be addressed to:—Sam Kay Rubber Co. Ltd., Hope Mill, Portwood Place, Stockport. (542)

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Silvertown, E.16.
require a

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to be responsible for
DESIGN AND MANUFACTURE
of moulds and dies for
RUBBER, EBONITE
and plastics processes.

Applications are invited from men (aged 27-45) of H.N.C. educational standard, with considerable experience in this work.

Send full details of education, experience, age, etc., to:
Mr. P. K. Brewin (Ref. SMD),
BTR INDUSTRIES LTD.,
Herga House,
Vincent Square, London, S.W.1.

(610)

APPOINTMENTS VACANT

(continued)

BIRKBYS LIMITED, Liversedge, Yorkshire, require a senior chemist for work including the preparation, evaluation and use of thermosetting resins, mainly of the phenol formaldehyde type, in the manufacture of moulding materials, resins, varnishes, etc. Knowledge of thermoplastic materials for evaluation and testing is also required. It is desirable that applicants, preferably between the ages of 35 and 45, should have first-class honours degree in chemistry or equivalent, together with several years' experience of handling the products derived from phenol formaldehyde resins. This is a highly responsible and permanent position with pension, and the salary offered will be commensurate with ability and qualifications. Please give full personal details and particulars of experience to Mr J. N. Stone, Director and General Manager. Replies will be treated confidentially. (615)

PRODUCTION ENGINEER

required by Rubber Manufacturers in the East Midlands

to take charge of the preparation of production layouts employing the latest techniques in materials handling, and to initiate the design of special purpose production equipment.

The work is of an interesting and varied character and an attractive salary will be offered to a suitable man who has achieved at least H.N.C. or equivalent qualification.

Reply in confidence stating age, experience and present salary to Box 593. (593)

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wanted for Mould and Die Manufacturers

Engineers with considerable experience would welcome the prospects for running own department.

Starting salary about £1,100 per annum.

Apply Box 609. (609)

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The Company has a vacancy for a rubber technologist at the Barry, Glamorgan, factory of the Plastics Division.

The duties at Barry involve technical service work, particularly the improvement of the properties of rubber compositions by the addition of synthetic resins.

Candidates, aged not over 35, must have several years' experience of rubber technology or of laboratory work in the rubber industry. They should hold a degree in Chemistry, a qualification of the Institution of the Rubber Industry, or an equivalent qualification; provided they have the required technological experience, candidates holding H.N.C. in Chemistry will be considered.

Write:

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THE DISTILLERS COMPANY LIMITED
21/22 BOLTON STREET
LONDON, W.1.

Quote Ref. 115/60 R.J.

(607)

APPOINTMENTS VACANT

(continued)

RUBBER company moving in the near future to East Anglia require an assistant chemist/technologist. Applicants should be 20-28 years of age, educated to L.I.R.I. standard, and be capable of controlling laboratory, production and development work in all classes of elastometers, natural and synthetic. Reply in confidence, giving details of experience and salary required.—Box 600. (600)

FOREMAN wanted to take complete charge of rubber moulding shop. Desired experience includes operating piece work system. Bonding experience also an asset. Applicant should indicate remuneration required.—Howard Clayton-Wright Ltd., Wellesbourne, Warwick. (614)

SENIOR assistant, 22-28 years of age required to supervise physical testing section of rubber manufacturer's laboratory near Manchester. Previous experience of physical testing essential and education up to L.I.R.I. standard or equivalent preferred. Good prospects, present staff aware of advertisement. —Apply giving full details of age, education, experience and salary required to the Chief Chemist, Box 595. (595)

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REPRESENTATIVE required by old established company to cover Norfolk, Lincolnshire, Northamptonshire, Nottinghamshire, Leicestershire, etc. Hose, belting and protective clothing, etc. Ideal opportunity for young energetic man. Resident in and experience of territory an advantage. Car provided. —Write in confidence with full details stating salary required, to Managing Director, Box 617. (617)

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NO. 11 Banbury with 250 h.p. drive. K.4 Intermix with 110 h.p. drive. 8½-in. extruder with 120/40 h.p. variable speed drive. 8in. Camelback extruder, 4in. Camelback extruder, 3in. extruder. 9in. x 4in. 2-speed laboratory mill.—Reed Brothers (Engineering) Ltd., Replant Works, Woolwich Industrial Estate, London, S.E.18. Tel.: Woolwich 7611 (6 lines). (606)

STEAM-HEATED rubber vulcanizing oven, 4ft. dia. x 6ft. long, in first-class condition.—Box 358 (358)

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6d. a word, Minimum 12/6 Box 2/-

MELLOR Equipment Ltd., Springfield Lane, Salford, 3, buy used machinery of Francis Shaw and Joseph Robinson manufacture.—Telephone: Manchester, Blackfriars 1866. (441)

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6d. a word, Minimum 12/6 Box 2/-

FOR SALE. Approximately 20 tons synthetic latex.—Samples and further details Box 612. (612)

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